Bridge Inspection Manual

FOR INVENTORY AND APPRAISAL
OF
ALABAMA BRIDGES

ALABAMA DEPARTMENT OF TRANSPORTATION
MAINTENANCE BUREAU
1409 COLISEUM BLVD
MONTGOMERY, ALABAMA 36110

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Alabama Department of Transportation Maintenance Bureau

Bridge Inspection Manual

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Alabama Department of Transportation Maintenance Bureau

Bridge Inspection Manual

Chapter 1: Introduction and Purpose

General Purpose

This manual has been prepared by the Alabama Department of Transportation (hereafter called ALDOT or the Department) to outline the general policies, practices, and procedures which are used to carry out the bridge inspection program in this state. It outlines and explains, in as simple a manner as possible, the complex series of regulations and instructions which govern the periodic inspection, data collection, and documentation of bridge structure information.

Useful information for bridge inspection personnel is also found in several other federal, state, and independent manuals, available from a variety of sources. No attempt has been made to include in this Bridge Inspection Manual all information contained in those manuals, which is pertinent to bridge inspection operations. However, certain useful information is included, and in some cases, reference is made to the appropriate sections of those manuals. This Bridge Inspection Manual does not nor can it describe procedures for every conceivable situation that may arise. The intention of this manual is not to eliminate the need for individual engineering judgment and initiative, but rather to provide the user with sufficient information so that their training and experience may be better applied to both routine and unusual problems encountered within the framework of these procedures.

Introduction

In 1967, the Silver Bridge between Virginia and Ohio collapsed during rush hour. Many vehicles were stopped on the structure for a traffic signal and the loss of life was great--46 fatalities. This highly publicized disaster focused the nation's attention upon the age and condition of existing bridges.

The United States Congress added provisions to the Federal Aid Highway Act of 1968 which required the Secretary of Transportation to establish a national bridge inspection standard and to develop a bridge inspection program. Since then, the bridge inspection program has been continuously modified and improved. It is now a comprehensive set of procedures that requires training and management attention to monitor hundreds of thousands of bridges across the United States.

Bridge Inspection personnel at all levels of government have the primary duty of carrying out the responsibility to provide adequate levels of inspection service for bridge structures under their respective jurisdiction, as outlined in the Code of Federal Regulations and as adopted by the AASHTO Subcommittee on Bridges and Structures. Bridge inspection personnel should become familiar with the contents of this manual and conduct bridge inspection program operations under their respective charge within the guideline contained herein.

Goals of this Manual

The overriding goal of this document is to present a collection of instructions and explanations for conducting the bridge inspection program in the State of Alabama. The purpose is to allow the user to locate and understand the most pertinent items from a complex series of publications. Those ideas have been simplified, condensed, and organized in a manner that allows the user to locate them easily. The specific objectives of this document are outlined in five simple statements:

1. To assemble in one document the primary instructions needed by bridge inspectors.

2. To provide a document that may be used for basic training in bridge inspection procedures pertinent to structures in this state.

3. To provide a document that will promote consistency in inspection across jurisdictions and from year to year.

4. To provide guidance and advice for the most difficult inspection items, condition ratings, and appraisals of structural components, using examples and illustrations pertinent to Alabama structures.

5. To increase the understanding by local governments and local government inspectors of the overall bridge inspection program.

Authority

The federal inspection and reporting requirements for structures are contained in the National Bridge Inspection Standards (Chapter 23 - Code of Federal Regulations, Part 650, Subpart C). The CFR Standards are applied to all bridges on public roads.

A bridge is defined by 23 CFR 650 as 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.

Even though there is now an extensive system for inspecting and repairing bridges, there is a staggering problem with older bridges. Every year, about 150 bridges collapse in the United States, resulting in an average of 12 deaths. At printing, in Alabama, the average age of all bridges is approximately 44 years. Obviously, much work must be accomplished to keep these structures in safe operating condition.

There are many general requirements set forth in the CFR which govern the bridge inspection program. Several of these provisions are briefly reviewed in the following paragraphs.

<u>**General Inspection Requirements:**</u> Each state highway agency is required to have an inspection and reporting program. The bridge inspectors participating in this program are required to meet certain minimum qualifications. Each bridge must be load rated, and bridge records and inventories

must be prepared and maintained. A master list must be maintained of certain bridge information, such as:

1. Structures with fracture critical members.

2. Structures that require underwater inspection.

3. Structures with unique or special features requiring additional attention.

4. The dates of the last inspections of the above mentioned features.

Inspection Frequency: In general, each bridge is to be inspected at intervals of no more than two years. Some bridges or types of bridges may require inspection more frequently, as fully described in the remainder of the manual. The *BI-6* section and the *Guidelines for Operation* in Appendix G contain additional information on inspection frequency.

Inspector Qualifications: The key individuals participating in bridge inspection must have certain training and qualifications in order to conduct this business. The CFR requires that the individual in charge of each organizational unit responsible for bridge inspection must meet one of the following qualifications:

1. Be a registered professional engineer in the state of Alabama, or

2. Be qualified for registration as a professional engineer in the state of Alabama, or

3. Have a minimum of ten years of bridge inspection experience and be certified as a bridge inspector based upon successfully completing a training course on the FHWA *Bridge Inspector's Reference Manual.*

The CFR further requires that the individual in charge of a bridge inspection team must:

1. Meet the qualifications of the preceding paragraph, or

2. Have five or more years of experience in bridge inspection and have passed a training course based on the FHWA *Bridge Inspector's Reference Manual*, or

3. Be certified as a Level III or IV Bridge Safety Inspector under the National Society of Professional Engineers NICET (National Institute for Certification in Engineering Technologies) Program.

Note: ALDOT further requires that a bridge inspection team leader have additional training, as explained later in this section during the discussion of training.

Structure Inventory: Each state is required to maintain an inventory of all bridges subject to the 23 CFR 650 conditions. Certain minimum data items must be collected, recorded, and filed by the controlling agency in a computerized database. The minimum number and type of items in this database are specified by the Federal Highway Administration (FHWA). The format of these standard minimum items is rigidly controlled and is the same from state to state. This allows the FHWA to maintain an on-line national bridge inventory from the database of each state. Thus, it is possible for FHWA to make comparisons from state to state or to prepare reports of nationwide bridge trends and bridge data.

Newly constructed structures, or those which have been reconstructed and modified, must be re-inspected and any data items which have been altered must be entered into the state's computerized inventory file. All information should be updated as soon as possible, but the data must be entered no later than ninety days after any changes for bridges on the state's system and 180 days for all other structures on public roads.

Summary: This brief synopsis of 23 CFR 650 has been intended to introduce the reader to the basic minimum requirements of the National Bridge Inspection Standards. These basic requirements have been amplified and explained through many additional documents, several of which are introduced in the next section of this manual.

Pertinent Publications

This manual is a collection of pertinent material taken from many documents containing bridge inspection procedures and requirements. The foremost of these is the *Federal Aid Policy Guide,* which generally repeats and amplifies the CFR requirements. It is the document that the FHWA uses to administer the Federal Aid Program.

Portions of the Department's *Guidelines for Operation* (called *Guidelines* hereafter) are pertinent to bridge inspection. The *Guidelines* document is incorporated by reference into this manual, and appropriate individual guidelines have been listed in Appendix G.

The *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, report No. FHWA-PD-96-001, December 1995 (hereafter called the *Coding Guide*) is the primary authority for conducting the actual bridge inspections. The BI-6 and BI-5 sections of this manual are composed of *Coding Guide* materials, altered and expanded to fit Alabama conditions.

Several publications of the American Association of State Highway and Transportation Officials (AASHTO) and the FHWA are pertinent to bridge inspection. The *AASHTO Manual for Bridge Evaluation* (hereafter called *MBE*), the AASHTO Manual for Bridge Element Inspection, and the *FHWA Bridge Inspector's Reference Manual* (hereafter called *BIRM*) are key documents in explaining how the inspections are to be conducted, what the inspector is to look for, and which technical procedures are to be used in making inspections. The following publications are addenda to *the BIRM*: FHWA *Bridge Inspector's Manual for Movable Bridges*, FHWA *Culvert Inspection Manual*, FHWA *Inspection of Fracture Critical Bridge Members*, and FHWA *Underwater Inspection of Bridges*. These and similar documents are referenced and discussed in the appropriate sections of this manual.

Each of those documents is revised and supplemented from time to time. Throughout this manual, whenever a reference is made to such a publication or document, the most recent version or most recent supplement is incorporated by reference.

Application

The provisions of this manual apply to all bridge structures on public roads in Alabama. Those structures on the state system fall under the jurisdiction of ALDOT. Those structures on local government routes must be inspected and reported upon by local governments.

This manual, the *Coding Guide*, and the pertinent AASHTO documents apply uniformly to both state and local government bridge inspection and reporting.

Portions of this manual have been tailored exclusively for the uses of the Department. Other portions of the manual were prepared expressly for Department inspectors but also have applications to local government inspectors.

Where questions arise about the applicability of any portion of this manual, the local government manager or local government bridge inspector should contact the nearest Area Office of ALDOT or the Local Transportation Bureau of the Central Office.

Use of Bridge Inspection Data

Congress envisioned several uses of bridge inspection data when the Structure Inventory & Appraisal (SI&A) program was created. First and foremost, the data allows a direct assessment of the condition of the nation's bridges, and identifies those bridges which are candidates for replacement or rehabilitation. The program also has other uses. For example, it serves as the basis for investigation and reporting of the suitability of certain routes in times of national emergency. Both the Department of Defense and the Federal Emergency Management Agency (FEMA) use the SI&A file for such purposes.

The primary users of SI&A files are the individual state highway agencies that find this information to be of great importance in preparing bridge construction and management programs, in budgeting for these programs and in making difficult decisions regarding public expenditures of scant bridge replacement funds.

Training of Bridge Inspectors

At printing, the average bridge in the State of Alabama is approximately 47 years old. These older structures are narrower and were designed to carry smaller, slower vehicles than today's fleet. At the same time, this state has some of the most technologically advanced and sophisticated types of bridges in existence. Design, construction, and safety techniques have evolved considerably over the years. However, the same bridge inspector who must examine a seventy year old structure built to yesterday's standards might go down the same highway to inspect a highly sophisticated structure built to tomorrow's standards. This requires knowledge, skill, and training.

AASHTO and the U. S. Department of Transportation understood the need for exhaustive bridge inspector training. Publications and training courses were prepared for this purpose. Persons inspecting structures must understand structural analysis (i.e. how stresses are passed from one member to another), and structural design (i.e. how bridge members are chosen to resist these stresses). They must also understand the aging process in structures and the role that fatigue and corrosion plays in reducing a structure's ability to carry loads. They must understand the names of bridge structural components and the roles that each of these components play in carrying loads and transferring stresses. They must understand expansion and contraction, bearings, foundations, and other supports. They must have an appreciation of traffic engineering, pavement life, and other factors necessary to perform a bridge inspection.

Obviously, there are very few people who possess the cumulative knowledge to conduct a complete inspection of a major structure without adequate training. The Department periodically sends its bridge inspectors to a comprehensive training course based on the *BIRM* and addenda. Individuals who successfully complete this course and who pass a comprehensive exam on the course material are eligible to become certified as bridge inspectors. Once an inspector has become certified, they are issued a unique certification number.

Additionally, the Department holds Annual Bridge Inspection Refresher Courses, every fall. It is recommended every year that state and local government inspectors attend the Department's training school, in preparation for inspection of bridge structures. The Department also conducts a two day BrM and Element Inspection Course that must be attended once for certification.

23 CFR 650.307 requires certain inspector qualifications, as explained earlier in this section. The Department has added an additional qualification for bridge inspection team leaders. They must attend the Department's bridge inspection refresher course once in order to become certified. Annual attendance at this training is highly recommended, but the inspector must attend this course at least once every other year to maintain their certification. **NOTE**: In November 2002, ALDOT started requiring all Professional Engineers performing NBI bridge inspections to also be a Certified Bridge Inspector.

Forms

The Department depends heavily upon the use of several forms for recording bridge inspection information. Each form is designated with the letters "BI" (standing for bridge inspection) followed by the number of the form. Below are the designations and form names.

Designation	Name
BI-1 Form	BIN Assignment
BI-4 Form	Streambed Cross Sections
BI-5 Form	Bridge Inspection Condition Report
BI-6 Form	Structure Inventory and Appraisal
BI-9 Form	Structure Maintenance Needed Estimate
BI-13 Form	General Narrative

Copies of the forms may be found in Appendix D of this manual, and their use and content are discussed in the following paragraphs.

BI-1 Form: BIN Assignment. The BIN is a unique unchanging six digit code used to succinctly identify each physical bridge structure in the state. The BI-1 form is used to obtain a Bridge Identification Number (BIN) for new bridges and culverts. The form is completed and sent to the Bridge Management Section of the ALDOT Maintenance Bureau for assignment of the BIN for state and city owned structures, and to the ALDOT Local Transportation Bureau for county owned structures. A copy of the form can be found in Appendix D.

BI-4 Form: Streambed Cross Sections. The BI-4 form is used to record streambed cross sections for all bridges subject to scour. A minimum of two profiles (one for each side of the structure) must be taken during routine inspections (2-year cycle) using this form. A copy of this form can be found in Appendix D.

BI-5 Form: Bridge Inspection Condition Report. Usually the most difficult decisions made by a bridge inspector involve evaluating the condition of various bridge components and providing condition ratings or appraisal ratings. For example, an inspector must look at all the substructure components to arrive at a substructure NBI condition rating between nine and zero, where the high numbers indicate good conditions, and the low numbers represent poor conditions. The inspector must also look at all the substructure components to arrive at element condition states between 1 and 4, where 1 indicates good conditions and 4 indicates severe condition.

The Department has created the BI-5 form (see Appendix D) for recording the NBI condition ratings and element condition states for each structure. The BI-5 form provides a location for the inspector to rate each element of a bridge, and an adjacent space to record pertinent comments. After all elements of a particular item have been evaluated, then the inspector enters the element condition states and overall NBI condition rating of the components being rated, and records any remarks.

The ratings for each of the individual items are entered in the Condition Task of ALDOT BrM. For more information refer to the BI-5 section of this manual.

The BI-5 form is filed in the bridge folder for future reference, and is an official record of the bridge inspection.

BI-6 Form: Structure Inventory and Appraisal. The BI-6 form is used to record the SI&A data for each structure. It contains locations for each of the inspection items required by the *Coding Guide*, and for additional items required by the Department. A copy of the BI-6 form may be found in Appendix D of this manual.

The form is nine pages long and is divided into six tasks or subtasks with 28 groups of information. Within each task or subtask there are multiple groups with items pertaining to a particular topic. Each page is labeled with a task or subtask which corresponds to the ALDOT BrM screen used to input the data into the bridge inventory file.

For any individual structure, the appropriate BI-6 form is printed with any available data preprinted on the form. This provides great convenience to the inspector, since all current data items are identified on the form, and there is no need to copy or transfer data manually prior to visiting the structure in the field. Adjacent to the listing of current data values are blanks for the insertion of new or changed data values. The inspector may simply mark through the current value of an item and write the new value adjacent to it. For a typical structure, very few items will change from inspection to inspection and the recording of data is minimized by the preprinting of the current values.

The BI-6 form is filed in the bridge folder for future reference, and is an official record of the bridge inspection.

BI-9 Form: Structure Maintenance Needed Estimate. This form is used to transfer maintenance and repair requirements from the bridge inspector to the individual responsible for scheduling bridge maintenance operations. During each bridge inspection the inspector identifies, quantifies, and prioritizes any maintenance needs present. A copy of the form may be found in Appendix D of this manual.

BI-13 Form: General Narrative. The purpose of this form is to provide a place to record information that is not otherwise covered by a numbered inspection item. It also provides a place to record additional information concerning certain numbered items. This form will in effect, over time, generate a narrative history of each structure. A copy of the form may be found in Appendix D of this manual.

Organization of ALDOT

The Department establishes policies and practices with which to conduct its business. These are based upon specific acts of the Alabama Legislature, and upon the rules and regulations of the Department which have the force and effect of law. The Department also adopts guidelines, policies, and operating procedures with which to carry out its rules and regulations. This Manual is one of the documents through which the Department publishes its established guidelines and policies.

The Transportation Director is responsible for enforcing the pertinent laws and Department policies. Under the Director is the office of the Chief Engineer and three Deputy Directors. The Director has authorized the Deputy Director for Operations to oversee day-to-day technical operations of the Department in carrying out Department policies.

Department Central Offices The Department's Central Offices are located at 1409 Coliseum Boulevard, Montgomery, Alabama. This complex houses the offices of general administrators and Bureaus. The Bureaus provide policy and supervision of specific functional areas for the Department (e.g., Bridge Bureau, Construction Bureau, Design Bureau, Legal Bureau, Maintenance Bureau, Transportation Planning Bureau).

In the Central Office, responsibility for bridge inspection and bridge rating belongs to the Maintenance Bureau. This Bureau is under the direction of the Maintenance Engineer, who represents the Deputy Director for Operations in performing this function.

Additionally, local government bridge inspection is coordinated through the Local Transportation Bureau, which is headed by the County Transportation Engineer. This Bureau coordinates its activities with the Maintenance Bureau for purposes of training inspectors, inspecting bridges, entering data into the inventory file, evaluating bridges, and similar functions.

Department Field Offices The principal field offices of the Department are located in ten areas across the state. They are located in (1) Guntersville, (2) Tuscumbia, (3) Birmingham, (4) Alexander City, (5) Tuscaloosa, (6) Montgomery, (7) Troy, (8) Grove Hill, (9) Mobile, and (10) Fayette. The secondary field offices of the Department are the district offices. Three to six district offices are located in each area. A District Manager oversees the operations of each district office.

The Area Bridge Inspector is responsible for day-to-day supervision of bridge inspection efforts, for entering bridge data into the inventory file, and for otherwise conducting the bridge inspection program. The Department's District Managers are normally not directly involved in the bridge inspection program. Each District Manager oversees one district (usually one or two counties in size) and is responsible for construction, maintenance, permitting, and similar activities within the district.

For the convenience of the reader, a map of the Department's districts and areas has been included in Appendix A of this manual.

How to Use this Manual

This manual has been organized in sections to assist the reader in easily finding needed material. Each section corresponds to a particular inspection form and the corresponding task in ALDOT BrM.

For example, the BI-1 section gives instructions for completing the BI-1 form. The BI-6 section is divided into several subsections, which are labeled as tasks or subtasks, pertaining to specific portions of the BI-6 form (Structure Inventory and Appraisal Sheet). These tasks or subtasks correspond to the ALDOT BrM screens used to input the data into the bridge inventory file. For instance, an inspector desiring to learn more about navigational data for a particular structure would be interested in the BI-6 – Appraisal Task, Clearances section of this manual.

Information in the BI-6 sections conforms to the topics in the *Coding Guide*. Where possible, individual bridge components are referred to by item number. The same item number is used in the *Coding Guide*, the BI-5 form, the BI-6 form, and this manual. In addition to the *Coding Guide* Items, several supplemental items needed by the ALDOT bridge management system are on the inspection forms. The supplemental items are numbered 200 and above. Each section is intended to be as all- encompassing as practical. The material should be self-explanatory so that an inspector may use this manual to inspect and code bridges without having to refer to a large number of additional reference documents. Instructions for entering the inspection data into the Bridge Management System is discussed in the *ALDOT BrM User Guide.*

Several additional sections in this manual address topics which are not completely addressed by the *Coding Guide.* These sections generally reflect procedures and guidelines used by the Department in performing and documenting bridge inspections. These additional sections reflect practices found to be useful in field and office operations, and include underwater inspections, fracture critical members and scour.

Revisions of this Manual

It is the responsibility of the inspector (or the owner of this manual) to obtain and use the most recent Department guidance on bridge inspection. The Department normally issues updates of this manual as they become available. However, in some instances new federal policies may become effective on short notice. It may not be possible to prepare amendments to the manual and to provide them to users prior to the effective date. The Department will attempt to supply notice when this occurs; however, it remains the responsibility of the inspector (or the user of this manual) to obtain any updates or supplemental materials.

Manual Revision History

	Date	Description
First Edition	Jan 1990	Initial Publication
Second Edition	May 1995	Conversion to Metric units and General update
Third Edition	Sept 1999	General update
Fourth Edition	Jan 2002	Conversion to US Customary units and General update
Fifth Edition	July 2014	Conversion from ABIMS to AASHTOWare BrM
Sixth Edition	Dec 2017	General update
Seventh Edition	Oct 2021	Updated BI-1 form and Chapter 2

Chapter 2: BI-1 – BRIDGE IDENTIFICATION ASSIGNMENT

ALABAMA DEPARTMENT OF TRANSPORTATION
BRIDGE IDENTIFICATION NUMBER (BIN) ASSIGNMENT CARD
(FORM BI-1)

NEW STRUCTURE IS TO REPLACE A PREVIOUS STRUCTURE? __ (If replacing existing structure mark "X" otherwise leave blank.)

NEW BIN (Will be assigned by ALDOT Maintenance Bureau): __ __ __ __ __ __

For 'Under' records, fill in the BIN for the associated 'Route on Structure' (type 1) Record Here: __ __ __ __ __ __

BI MANUAL PAGE	ITEM	STRUCTURE NUMBER	
2-3		BRIDGE STATUS	__
2-3	13A	LRS INVENTORY ROUTE	0 0 0 __ __ __ __ __ __ __ 0
2-3	13B	LRS INVENTORY SUB ROUTE	__ __
2-4	11	MILE POINT	__ __ __ . __ __
2-4	205	RELATIVE POSITION INDICATOR	__ __
2-5	201	LOCAL IDENTIFIER	__ __ __ __

BI MANUAL PAGE	ITEM	INVENTORY ROUTE	
2-5	5A	RECORD TYPE	__
2-5	5B	ROUTE SIGNING PREFIX	__
2-6	5C	DESIGNATED LEVEL OF SERVICE	__
2-6	5D	ROUTE NUMBER	__ __ __ __ __
2-6	5E	DIRECTIONAL SUFFIX	__
2-9	42A	TYPE OF SERVICE (ON)	__
2-10	42B	TYPE OF SERVICE (UNDER)	__

BI MANUAL PAGE	ITEM	LOCATION AND OWNERSHIP	
2-10	7	FACILITY CARRIED	____________
2-10	6A	FEATURE INTERSECTED	____________
2-11	16	LATITUDE	__ __ D __ __ M __ __ . __ __ S
2-11	17	LONGITUDE	0 __ __ D __ __ M __ __ . __ __ S
2-11	2	ALDOT AREA	__ __
2-12		ALDOT DISTRICT	__ __
2-12	3	COUNTY	__ __
2-12	4	CITY/TOWN	____________
2-12	203	MPO	____________
2-13	22	OWNER	__ __
2-13	21	MAINTENANCE RESPONSIBILITY	__ __
2-14	283	INSPECTION AGENCY	__ __
2-15	215	PREVIOUS STRUCTURE BIN	__ __ __ __ __ __

NOTE: Item Numbers for bridge data are those as described in the Alabama Department of Transportation Bridge Inspection Manual

Point of Contact Name (Print) :	
Phone Number: (__ __ __) __ __ __ __ __ __ __	Email:
Date: __ __ / __ __ / __ __ __ __	Project Number:

Revised October 2021

Figure 1: BI-1 Form – BIN Assignment Card

INTRODUCTION

This section provides information on how to complete the BI-1 form, Bridge Identification Number (BIN) Assignment Card. This form provides the information needed in order to create a new SI&A record in the ALDOT BrM database.

The FHWA requires that each bridge have a unique and unchanging number. Coding of this 15-digit Federal item is established according to each state's internal processing procedures. In Alabama, the BIN is used as the official structure number for Federal reporting purposes.

The BIN is a unique 6-digit code used to identify each structure in the state. BIN's are progressive, sequential numbers assigned to all records in the ALDOT BrM database. Only one BIN is assigned to each physical structure, and this BIN will never change during the life of the bridge. The BIN has no meaning other than to be a unique unchanging number assigned to the bridge structure.

All BINs are assigned to each structure through the office of the Bridge Management Engineer in the Maintenance Bureau of the Alabama Department of Transportation.

For all "Route on Structure" records and "Route Under" records with no associated "Route on Structure" record (pedestrian and railroad overpasses) the BI-1 form is completed, except for the BIN. For "Route Under" records that have associated "Route on Structure" records (grade separations), the BIN for the associated "Route on Structure" record is noted on the form along with other pertinent information.

In the past a separate item known as the "Structure Number" was coded to provide the inspectors with an additional means of accessing a particular bridge in the database. Therefore, while this item is no longer coded for bridges, a "Structure Number" is still assembled from other data items. The structure number is assembled by joining: Bridge Status, Item 13 (LRS Inventory Route), Item 3 (County), Item 11 (Milepoint), and Item 205 (Relative Position Indicator). For non-state owned structures Item 11 will be replaced with Item 201 (Local Identifier).

NEW STRUCTURE IS TO REPLACE A PREVIOUS STRUCTURE

A box is provided to the right of this statement to indicate if the new structure was built to replace an existing structure. If this is the case place an "x" in the box and enter the BIN of the old structure which is being replaced in order for this BIN to be inactivated. If the new structure does not replace an existing structure, the box and the structure BIN spaces are to be left blank.

NEW BIN (TO BE ASSIGNED)

For "Route on Structure" records and "Route Under" records with no associated "Route on Structure" record (pedestrian and railroad overpasses) the inspector should leave this field blank as the BIN will be assigned by the Bridge Management Engineer in the Maintenance Bureau of the Alabama Department of Transportation.

For "Under" records that have associated "Route on Structure" records (grade separations), the BIN for the associated "Route on Structure" record is recorded in this field by the inspector. Although there is only one BIN assigned for all "Route on Structure" and "Route Under" records associated with any one bridge structure, the various records can be differentiated by the respective record types (Item 5A).

BRIDGE STATUS

This item is used to indicate whether the structure is planned, in service, or inactive. The valid codes are as follows:

Code	Description
P	Proposed - Structure is planned, under design/construction, or otherwise not yet in service.
A	Active - Structure is currently in service.
I	Inactive - Structure not in service (either removed or closed permanently with no plans to replace).

ITEM 13 — LRS INVENTORY ROUTE, SUB ROUTE NUMBER

This is a 12-digit field used to record the LRS inventory route number, and the sub route number. This item is made up of two subfields which are described as follows:

Subfield	Description	Length
13A	LRS Inventory Route	*10 digits (in Alabama the first 3 digits and last digit are zeroes)*
13 B	Sub route Number	2 digits

If Item 012-National Base Net is to be coded "On Base Network", the information to be recorded for this item is the inventory route for the state's linear referencing system (LRS).

The LRS inventory route numbers to be reported in this item must correspond to the LRS inventory route numbers reported by the state for HPMS.

The LRS inventory route number can be alphanumeric. The LRS inventory route number is not necessarily the same as that posted along the roadway, but is a number used to uniquely identify a route within at least a county and perhaps throughout the state.

The sub route number is a number that uniquely identifies portions of an inventory route section where duplicate mile points occur. These sub route numbers, if they exist, are identified in the state's HPMS-LRS records. If there is no sub route number, code "00" for Item 13B.

Code	Description
IN	Interstate
AL	Alabama State Route
CO	County Route

MU	Municipal, City Route
NG	National Guard
PF	Park/Forest Route
OS	Other State Route
OF	Other Federal Route

Examples:	Code 13A	Code 13B
Inventory Route I-65	000IN00650	00
Inventory Route AL 75 E, Sub route Number 3	000AL00750	03
Inventory Route County Road 188	000CO01880	00
Inventory Route City Street 1861	000MU18610	00

ITEM 11 — MILE POINT (XXXX.XXX)

This item identifies the linear referencing system (LRS) mile point to establish the location of the bridge on the Base Highway Network as identified in Item 012. The mile point is a 7-digit number coded to the nearest thousandth of a mile. The location to be coded is at the beginning of the structure in the direction of increasing mile points along the LRS Inventory Route identified in Item 13A.

This item must be coded for all structures located on or overpassing the Base Highway Network. For structures carrying the LRS Inventory Route, code the mile point at the beginning of the structure (i.e. the lowest mile point on the bridge). When the LRS Inventory Route goes under the structure (Item 5A coded "Route Under"), then code the mile point on the under-passing route where the structure is first encountered.

Code all zeros if a mile point location cannot be determined or is not appropriate. If the beginning of the structure falls at the beginning of a route, the mile point would normally be zero; however, it is to be coded with the nominal value of 0000.001 instead.

ITEM 205 — RELATIVE POSITION INDICATOR

This item identifies a structure's relative position to other structures which may overlap any mile point on the inventory route. This condition may occur at parallel structures, ramps, service road structures or any combination of the above. Any single structure is to be coded "00." Parallel structures by themselves are to be coded as "-1" for the leftmost structure in the direction of the inventory route, and "1" for the rightmost. Where service road and ramp structures are present, the same numbering scheme (i.e. -3, -2, -1, 0, 1, 2, 3) for the left and rightmost structure is to be used.

ITEM 201 — LOCAL IDENTIFIER

This item describes the identifier for the structure used by local government agencies. Some local government agencies use the local identifier to develop their own structure numbering/identification schemes.

ITEM 5A — RECORD TYPE

There are two distinct types of records in the SI & A file. The first of these is for "on" records, and the second is for "under" records. This item is used to distinguish between "on" and "under" records. It must be emphasized that all route-oriented data must agree with this coding as to whether the inventory route is "on" or "under" the structure. This field contains the parameters listedbelow:

Code	Parameters
1	Route On Structure
2	One Route Under

"On" means that the inventory route is carried "on" the structure. Each bridge structure carrying highway traffic must have a "Route on Structure" record identified with Item 5A. All of the NBI data items must be coded, with respect to the structure and the inventory route "on" it.

"Under" means that the inventory route goes "under" the structure. If an inventory route beneath the structure is a Federal-aid highway, is a STRAHNET (see the BI-6 Inventory – Roads Subtask section) route or connector, or is otherwise important, a record must be coded to identify it. If only one under route exists, code One Route Under. If multiple under routes exist, begin with 1st Route Under, and continue adding corresponding under records for each additional route. In this case letters are used to differentiate between the multiple under records. For example, if a structure has 3 under routes, you will need to create 1st Route Under (A), 2nd Route Under (B), and 3rd Route Under (C) records.

Code	Parameters
1	Route On Structure
A	One Route Under
B	2nd Route Under
C	3rd Route Under

In most cases, when this item is coded as "under", only the items on the Inventory – Roads Subtask must be entered. However, there are unique situations in which a structure coded as under must have all of the data items coded. These situations are described as follows:

1. When Subfield 43B, under Item 43 - Structure Type, is coded as a tunnel ("18")

2. When Subfield 42A, which describes the type of service "on" the bridge is coded as "2" (railroad), "3" (pedestrian exclusively), or "9" (building plaza).

These examples typify "under" records for structures which do not have an "over" record associated with them.

ITEM 5B —KIND HIGHWAY (ROUTE PREFIX)

This item identifies the route signing prefix (administrative class of road) for the inventory route using one of the following parameters:

Code	Description
1	Interstate highway
2	U.S. numbered highway
3	State highway
4	County highway
5	City street
6	Federal lands road
7	State lands road
8	Other *(include toll roads not otherwise indicated or identified above)*

When 2 or more routes are concurrent (on the same roadway), the highest class of route is used. The hierarchy is in the order listed above. For example, if a single route is signed as both U.S. 82 and Alabama 6, it will be coded "2" because the U.S. numbered highway is higher in the hierarchy than the state highway.

ITEM 5C — DESIGNATED LEVEL OF SERVICE

This item identifies the designated level of service for the inventory route, using one of the following parameters:

Code	Description
0	None of the below
1	Mainline
2	Alternate
3	Bypass
4	Spur
6	Business
7	Ramp, Wye, Connector, etc.
8	Service and/or unclassified frontage road

ITEM 5D — ROUTE NUMBER

This item identifies the inventory route number. The route number in this field must agree with the route signing prefix coded in subfield 005B.

For "over" records (Item 5A = "Route on Structure"), if concurrent routes are of the same hierarchy level, denoted by the route signing prefix, only the lowest numbered route will be used. For example, where interstates I20 and I59 occupy the same roadbed, "00020" (lowest number) is entered in this subfield. Code "00000" for bridges on roads without route numbers. For "under" records (Item 5A = Route Under"), each route will have its own record.

In Item 005D, do not show the route prefix. For example, for I65 only the numerical "00065" goes in Item 005D. The "I" portion is shown by coding Item 005B "Interstate". Items 005B and 005D must be in agreement. That is, where Item 005B indicates a U.S. route, Item 005D must contain that U.S. route number (not the state route number).

ITEM 5E — SUFFIX

This item identifies the directional suffix of the inventory route number, when it is part of the route number. This field contains the parameters listed below:

Code	Description
0	Not applicable (usual coding for most routes)
1	North
2	East
3	South
4	West

In some cases, letters may be used with route numbers as part of the route numbers and not to indicate direction. In such cases, the letter should be included in the 5-position route number field.

Examples: The following examples illustrate typical coding of the five subfields, in the Inventory Route Item:

Description	Code				
	5A	5B	5C	5D	5E
U. S. 11, on	1	2	1	00011	0
Interstate 65, on	1	1	1	00065	0
Interstate 10E, under	2	1	1	00010	2
State Highway 104, Spur, under	2	3	4	00104	0
U.S. 31E Bypass, on	1	2	3	00031	2
City street, on	1	5	0	00000	0
Ramp from I-85, under	2	1	7	00085	0
County Highway 173 on	1	4	1	00173	0
Interstate 20 under	2	1	1	00020	0
Interstate 59 on	1	1	1	00059	0
State Hwy 120 (STRAHNET Rt) under	A	3	1	00120	0
Alternate State Hwy 130 under	B	3	2	00130	0
Tunnel on Interstate 10	2	1	1	00010	0

ITEM 42 — TYPE OF SERVICE
The type of service on the bridge and under the bridge is indicated by a 2-digit code composed of 2 segments

Segment	Description	Length
42A	Type of service on bridge	1 digit
42B	Type of service under bridge	1 digit

ITEM 42A — TYPE OF SERVICE (ON)
The first digit indicates the type of service "on" the bridge and shall be coded using one of the following codes:

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
10	Other

ITEM 42B — TYPE OF SERVICE (UNDER)
The second digit indicates the type of service "under" the bridge and shall be coded using one of the following codes:

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
10	Other

ITEM 7—FACILITIES CARRIED
This item is an 18-digit field that identifies the facility being carried by the structure. In all situations this item describes the use "on" the structure, even when item 5A indicates an "under" record. The following examples illustrate proper coding.

Examples:
U. S. 80
COUNTY ROAD 450
US 98
MAIN STREET
C & 0 RAILROAD *(appropriate for "under" record only)*
PEDESTRIAN BRIDGE *(appropriate for "under" record only)*

ITEM 6A — FEATURE INTERSECTED

This item is a 24-digit field that identifies the features intersected by the structure. When item 5A indicates an "under" record, this item describes the inventory route and/or features under the structure.
When one of the features intersected is another highway, the signed route number or name of the highway appears first (leftmost) in the field. The names of any other features follow, separated by semicolons or commas. Parentheses are used to provide a second identification of the same feature (see fourth example).

Examples:
L&N RAILROAD (ABANDONED)
I 20, US 78, MILL ROAD
ALA 6, WARRIOR RIVER
ALA 13 (POND ROAD)
ALAMUCHEE CRK.

ITEM 016 — LATITUDE

This item identifies the latitude of each structure in degrees, minutes, and seconds to the nearest hundred of a second. This is an 8-digit field. The degrees of latitude for the state of Alabama must be between 30 to 35 degrees. The location of the point to be coded is usually at the beginning of the bridge in the direction of the inventory route or any other consistent point of reference on the bridge which is compatible with the LRS. The reason for the specified precision is to facilitate the use of Global Positioning System (GPS) data directly into this item. If GPS readings are not available, the most accurate measuring methods available and level of precision may be used. The preferred precision is to the nearest hundred of a second. The following example illustrates the coding:

Example	Code
Latitude is 33^{o} 27' 18.55"	33d 27' 18.55" *(to match GPS)*

ITEM 017 — LONGITUDE

This item identifies the longitude of each structure in degrees, minutes, and seconds to the nearest hundred of a second. This is an 8-digit field. The degrees of longitude for the State of Alabama must be between 84 to 88 degrees. The location of the point to be coded is usually at the beginning of the bridge in the direction of the inventory route or any other consistent point of reference on the bridge which is compatible with the LRS. The reason for the specified precision is to facilitate the use of Global Positioning System (GPS) data directly into this item. If GPS readings are not available, the most accurate measuring methods available and level of precision may be used. The preferred precision is to the nearest hundred of a second. The following example illustrates the coding:

Example	**Code**
Longitude is 84^{o} 5' 50.65"	084d 05' 50.65" *(to match GPS)*

ITEM 2 — ALDOT AREA

This item identifies the Area where the structure is located. A map indicating area boundaries may be found in Appendix A of this manual.

When the bridge falls at the boundary between areas, it is identified as being in (and assigned to) the county or area to the west or south of the boundary. As a general rule, even numbered routes are understood to run from west to east, and odd numbered routes are understood to run from south to north. This method of assigning a bridge to a county and area is used unless a written agreement between the two counties or areas is on file in the bridge folder.

ALDOT DISTRICT

This item identifies the Departments district where the bridge is located. A map indicating the district boundaries may be found in Appendix A of this manual. The parameters in this field are District 1 through District 6.

When a bridge falls on the boundary between two districts, it is identified as being in (and assigned to) the district to the west or south of the boundary. This method of assigning a bridge to a district is used unless a written agreement between the two districts is on file in the bridge folder.

ITEM 3 — COUNTY

This item identifies the county where the structure is located. A complete listing of the counties may be found in Appendix C of this manual.

ITEM 4 — CITY/TOWN/PLACECODE

This item identifies the city, town, township, village, or other census-designated place where the structure is located. A complete listing of the cities, towns, townships, villages, or other census-designated places may be found in Appendix B of this manual.

If the structure does not fall within the boundary of a city, town, township, village, or other census-designated place, then "Unknown" shall be selected.

ITEM 203 — MPO CODE

This item identifies if a bridge is located in a MPO (Metropolitan Planning Organization) jurisdiction.

Contact the preconstruction engineer in the area office in which the structure is located to determine if it is within a MPO jurisdiction. If the bridge is not in a MPO jurisdiction, code "Not in an MPO." This field contains the parameters listed below:

Description
Not in an MPO
Auburn-Opelika Area
Birmingham Area
Calhoun Area
Columbus-Phenix City Area
Decatur Area
Dothan Area
Etowah Area
Huntsville Area
Mobile Area
Montgomery Area
Shoals Area
Tuscaloosa Area

ITEM 22 — OWNER

This item identifies the owner of the bridge. If more than one agency has equal ownership of the structure, select the agency highest in the hierarchy of State, Federal, county, city, railroad, and private. This field contains the parameters listed below:

Code	Description
01	State Highway Agency
02	County Highway Agency
03	Town or Township Highway Agency
04	City or Municipal Highway Agency
11	State Park, Forest, or Reservation Agency
12	Local Park, Forest, or Reservation Agency
21	Other State Agencies
25	Other Local Agencies
26	Private (other than railroad)
27	Railroad
31	State Toll Authority
32	Local Toll Authority
60	Other Federal Agencies (not listed below)
61	Indian Tribal Government
62	Bureau of Indian Affairs
63	Bureau of Fish and Wildlife
64	U.S. Forest Service
66	National Park Service
67	Tennessee Valley Authority

68	Bureau of Land Management
69	Bureau of Reclamation
70	Corps of Engineers (Civil)
71	Corps of Engineers (Military)
72	Air Force
73	Navy/Marines
74	Army
75	NASA
76	Metropolitan Washington Airports Service
80	Unknown

ITEM 21 — MAINTENANCE RESPONSIBILITY

This item identifies the agency that has primary responsibility for maintaining the structure. If more than one agency has equal maintenance responsibility, select the agency highest in the hierarchy of state, federal, county, city, railroad, and private. The parameters for this item are the same parameters used for Item 022 – Owner.

ITEM 293 — INSPECTION AGENCY

This item identifies the agency that has primary responsibility for inspecting the structure. If more than one agency has equal inspection responsibility, select the agency highest in the hierarchy of state, federal, county, city, railroad, and private. The parameters for this item are the same parameters used for Item 022 – Owner.

ITEM 215 — PREVIOUS STRUCTURE BIN

This item identifies the previous bridge's BIN. When an existing bridge(s) is torn down and replaced, the new bridge is assigned a new BIN. The previous structure(s) BIN is the inventory number for the old bridge(s) that was replaced. If the structure has never been replaced, code this item with all zeroes. Note that the Alabama ID may be the same for both the new and old structures, but they will each have a unique BIN.

POINT OF CONTACT NAME

This field captures the individual's name that filled out the BI-1 form.

PHONE NUMBER

This item captures the individual's phone number that filled out the BI-1 form.

DATE

This field captures the date the BI-1 form was field out by the bridge inspector.

EMAIL

This field captures the individual's email who filled out the BI-1 form.

PROJECT NUMBER

This field captures the structures project number.

Chapter 3: BI-4 – STREAMBED CROSS SECTIONS

ABIMS

Streambed Cross Sections

FORM: BI-4
BIN: 018022 1 REC
STR. NUM.: OAL0008 240075.014-1
Insp. Date: __________
Sheet: 1
Printed: 8/25/2014

IDENTIFICATION

DIVISION: 06 DISTRICT: 05 COUNTY: Dallas

PREVIOUS VALUES: U.S. CUSTOMARY

OFFSET: 21.37
SNDING DATE: 02 2014 VIEW: L OFST RMRK: FROM CL
ELEV BASIS: P
LOCATION OF BM: UNKNOWN
ELEV EQ: 0.00 = 0.00
STATION EQ: 0 + 0.0000 = 671 + 12.6000
SND/ELEV IND: S

	CURRENT		NEW	
STATIONS	SND/ELEV	REMARKS	SND/ELEV	REMARKS
0 + 0.0000	6.1500	ABUT #1 ON CAP		
0 + 3.3400	9.0000	R.R.		
0 + 16.3800	11.5300	R.R.		
0 + 33.3500	15.3400	BT #2 R.R.		
0 + 50.1700	15.8500	WATER		
0 + 67.2100	16.0000	BT #3 R.R. WL=15.1		
0 + 84.4100	15.2500	GRD		
1 + 1.1800	16.0000	BT #4 R.R. W		
1 + 18.3000	14.9500			
1 + 35.2300	14.7800	BT #5 R.R. W		
1 + 51.6300	10.7800	R.R.		
1 + 65.4400	7.8500	R.R.		
1 + 68.3800	6.1000	ABUT #6 ON CAP		

Figure 2: BI-4 Form - Streambed Cross Sections

INTRODUCTION

This chapter provides information on how to complete the BI-4 form, Streambed Cross Sections. This form was created for the collection of data in order to produce streambed cross sections to be included on the scour plots. This form must be completed during routine inspections (2-year cycle) for all scour potential bridges. If the bridge is not subject to scour, then this form need not be completed.

A minimum of two cross sections are required for each bridge subject to scour. Generally, these cross sections should be taken on each side of the bridge. Additional cross sections should also be obtained if scour is evident "away" from the bridge. Use this form for each cross section taken.

How to collect data?

There are two basic methods that can be used to collect the required data. The first method involves using a survey level and rod and is only suited for small streams with low water levels since one person must stand in the streambed and hold the rod. The second method, which is by far the most common, is to take measurements from the bridge deck by lowering a weighted tape from a fixed reference point such as the bridge rail. A standard survey tape with a weight attached to the end can be used for this purpose. The weight should be of sufficient mass to sink the tape to the bottom so that the measurements are not significantly affected by the stream current. Measurements taken by this second method are called soundings. Other methods for taking soundings, such as the use of a fathometer, are also acceptable provided that accurate and repeatable measurements are obtainable.

How many points should be taken?

Regardless of the method used, measurements must be taken from abutment to abutment with a sufficient number of readings to adequately describe the streambed cross section. All breaks in the groundline, especially in the streambed, and at the banks and intermediate piers shall be measured.

Where in reference to the bridge should the readings be taken?

Readings should be taken as close to the bridge as possible but must be along the same line as previous readings. As mentioned, additional profiles with various offsets can also be taken if scour is evident "away" from the bridge. If the level and rod method is used then it would be desirable to take measurements down the centerline of the bridge and other sets on the left and right side of the bridge. If a weighted tape is used then measurements should be taken from the left and the right side of the bridge. The VIEW, OFFSET and OFFSET REMARK items on this form (described below) are used to indicate the location of the readings.

Descriptions on how to record each item on the form will be provided in this chapter. For information on how to enter this information please refer to the ALDOT BrM User Manual.

All required data must be entered for the initial streambed soundings for each structure. However, for subsequent streambed soundings, if the same units, offsets, and sections are used when taking the streambed soundings, then only the new measurements need to be recorded on the data collection form.

PREVIOUS VALUES

This section contains information about the previous cross sections taken for any particular structure. If this data is valid for the current cross sections taken, then no modifications are necessary. However, if this information is not correct for the current cross section, then it should be noted on the form.

OFFSET

This field is used to indicate the distance of the offset from where the streambed soundings were taken. The offset field is four characters in length to record the offset distance to the nearest tenth of a meter or foot. For example, if the readings are taken from the left edge of the bridge deck, then this item should be recorded as one-half of the bridge deck width if the offset is from the centerline of the bridge.

SOUNDING DATE

This field is used to indicate the date that the cross sections were taken. The first two characters indicate the month and the last four characters represent the year.

VIEW

This field is used to identify the view in which the cross sections were taken. The view of the bridge would be determined when traveling in the direction of the inventory route (increasing mile markers). This field contains the parameters listed below:

Code	Description
L	Left view - data is for the left side of the bridge
R	Right view - data is for the right side of the bridge
C	Centerline view - data is for the centerline of the bridge.

OFFSET REMARK

This is a narrative field used to describe the offset location. This field is twenty characters in length. For example, a typical offset remark would relate an offset distance from the centerline of the bridge.

ELEVATION BASIS

This field identifies the type of platform the elevations for the soundings are based on. This field contains the parameters listed below:

Code:	Description:
A	Elevations are based on assumption. From some semi-permanent, fixed point, on or near the bridge, an elevation is assumed. All subsequent elevations for the structure are based on this "assumed" elevation.
G	Elevations are based on a U.S. Geodetic Survey bench mark or an Alabama Department of Transportation bench mark. This would be basically the same

as elevations from the bridge plans except that plans might not be available on the structure, but a geodetic marker is conveniently close.

P — Elevations are taken from the bridge plans. In this case, the elevations are usually based on a permanent U.S. Geodetic Survey bench mark or an Alabama Department of Transportation bench mark, as referenced in the bridge plans..

LOCATION OF BENCH MARK

This field identifies the location of the bench mark used for referencing the cross sections.

ELEVATION EQUATION

This field identifies the elevation equation which may be used to reference all vertical information from a common reference plane for plotting. If the bridge details are initially plotted based on some assumed reference elevation, and later plans are located showing the actual elevations for the bridge, the initial assumed reference elevation can be equated to what the actual elevation is at that point based on the information from the plans.

If a crew goes to the field to gather the bridge detail information and they set a reference point with some assumed elevations, such as 50.00 feet, then a different crew goes to gather the streambed sounding information and they use the same reference point but assume an elevation of 100.00 feet, these plots can and must be put on a common reference line by keying an elevation equation. In this case, the elevation equation on the streambed soundings form would be 50.00 feet equals 100.00 feet because the streambed soundings should be linked to the same elevation. It is important to be aware that an elevation equation may be required for each section of data such as bridge details, original groundline, and streambed soundings, so that they will all be correlated by a common reference point. The elevation equations should be completed as required for the bridge information to plot correctly.

STATION EQUATION

This field is used to capture a station equation which may be required to reference all horizontal information from a common reference point. If the beginning of the bridge was assumed to be at station 1 + 00.00 and plans were later discovered showing the beginning of the bridge at station 5 + 42.68, then a station equation could be used to correct the assumed station so that the historical reference material (i.e. plans and pile driving records) could be referenced appropriately to the bridge plot. It is important to be aware that the station equation may be required for each section of data such as bridge details, original groundline, and streambed soundings, so that they will all be correlated by a common reference point. The station equations should be completed as required for the bridge to plot correctly.

SND/ELEV IND

This field is used to indicate whether the recordings are actual elevations or soundings. This indicator is used by the program to determine the type of data that is being entered. The field contains the parameters below:

Code:	Description:
E	Elevation data gives actual elevations of the points. This would require the inspector to calculate the elevation based on measurements. For example, if the measurements are taken with a rod and level, then the elevation of each reading would be calculated by subtracting the rod reading from the elevation of the level (height of the instrument).
S	Soundings data should be used if the data recorded are measurements taken from the bridge deck railing or some other reference feature using a weighted tape with no calculations made. This measurement will automatically be subtracted from the curb/rail reference elevations recorded in the bridge detail information of the scour module. For more information on the bridge detail portion of the scour module, refer to the *Structure Scour/Hydrology Module Users Guide*.

STATION

This is a field used to record the particular station at which the sounding or elevation was taken. The maximum value that can be entered into the field is 99999 + 99.999. Negative stations can be entered, if needed.

SND/ELEV

This field is used to record the sounding measurement or elevation for each station. The maximum value that can be entered is 9999.99. Negative soundings may be entered, if needed. A value is required for this field if a station has been entered.

REMARKS

This is a narrative field used to record any pertinent remarks that are related to that station. This field is thirty characters in length.

Chapter 4: BI-5 – BRIDGE INSPECTION CONDITION REPORT

Inspection Report

FORM: BI-5 | STR. NUM.: OIN0085 510010.719+1 | Sheet: 1

BIN: 009005 | 1 REC | DIVISION: 06 | Printed: 9/4/2014

INSPECTION

PREVIOUS INSP
PREVIOUS DATE: 08/19/2013 — NEW DATE: ____________
PREVIOUS INSP. TYPE: Regular NBI — NEW INSP TYPE: ____________

RATING

	CURRENT	NEW
58) DECK RATING	4	
59) SUPERSTRUCTURE RATING	6	
60) SUBSTRUCTURE RATING	7	
61) CHANNEL & CHANNEL PROTECTION	N	
62) CULVERT RATING	N	

REMARKS

CHANNEL NO CHANNEL DECK SEE FILES SUPER SEE FILES SUB SEE FILES

MISCELLANEOUS

	CURRENT	NEW
71) WATERWAY ADEQUACY	N	
72) APPROACH ROADWAY ADEQ APPRAISAL	7	
36) TRAFFIC SAFETY FEATURES		
A) BRIDGE RAIL	0	
B) TRANSITION	1	
C) APPROACH RAIL	1	
D) END TREATMENT	1	

LOAD POSTING SIGNS:
A) REQUIRED ____________
B) PRESENT ____________
C) VISIBLE ____________
D) LEGIBLE ____________

Figure 3: BI-5 Form – Inspection Report

INTRODUCTION

The assignment of NBI condition ratings and element condition states is by far the most important portion of bridge inspection. Likewise, it is the most time consuming portion. The inspector examines each component of the bridge and assigns NBI condition ratings and element condition states during every routine inspection. The inspector must be close enough to touch the component being inspected (hands on inspection). Artificial light is used if natural lighting is insufficient to provide a thorough visual examination of the component. Special equipment may also be necessary to insure that a thorough and complete evaluation is performed.

This section of the manual combines information from the *FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*, *the BIRM*, the *AASHTO Manual for Bridge Element Inspection,* and various other sources in an attempt to give the inspector guidance in assigning condition ratings and element condition states. However, it is emphasized that this is by no means an in- depth training guide for bridge inspectors. It is merely a summary of information which can be used for quick reference. For information on how to enter the condition rating and element condition data into the computer, refer to the *ALDOT BrM User Manual.*

INSPECTION

PREVIOUS INSP:

This field identifies the certified bridge inspector who did the last inspection for this structure.

PREVIOUS DATE:

This field identifies the date when the structure was last inspected.

PREVIOUS INSP. TYPE:

This field identifies the previous inspection type.

NEW DATE:

This field is used by the inspector to capture the date that the current inspection was performed.

NEW INSP TYPE:

This field is used by the inspector to capture the inspection type of the current inspection.

RATING

GUIDELINES FOR NBI CONDITION RATINGS

NBI Condition ratings describe the current condition of the existing, in-place bridge as compared to the original as-built condition. Each of the following items are evaluated:

ITEM 58--DECK
ITEM 59--SUPERSTRUCTURE
ITEM 60--SUBSTRUCTURE
ITEM 61--CHANNEL AND CHANNEL PROTECTION
ITEM 62--CULVERTS
MISCELLANEOUS ITEMS

The BI-5 form is used to record the overall condition of the components listed above. This means that the bridge deck, superstructure, substructure, culvert, and channel will be entered using the NBI condition code assigned by the inspector as representative for that type of bridge component. Also pertinent remarks about the specific findings are written on this form. If a bridge does not have a certain type of component, the BI-5 form should be coded with an "N" for not applicable.

The following general condition ratings shall be used as a guide in evaluating Items 58, 59, and 60.

Code	Description
N	Not applicable
9	Excellent condition
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 minor section loss, cracking, spalling or scour.
4	Poor condition - advanced section loss, deterioration, 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 may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the structure 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. Structure is closed to traffic but corrective action may put it back in light service.
0	Failed condition - out of service; beyond corrective action.

Proper assignment of a condition rating considers both the severity of the deterioration or disrepair and the extent to which it is widespread throughout the component being rated. In other words, condition ratings provide an overall characterization of the general condition of the entire component being rated. Particular attention is given to evaluating the condition of the materials making up the component in regard to their structural integrity.

The load-carrying capacity of the bridge will not be considered in evaluating the general conditions of the bridge components listed above. Condition ratings assess the current condition of the structure as compared to its original as-built condition.

Bridges or bridge elements which are supported or strengthened by temporary members or elements will be rated as if the temporary conditions did not exist. Where a bridge is currently replaced by a temporary bridge, the condition of the bridge is rated without regard to the condition of the temporary bridge. Refer to Item 103, Inventory–Admin Subtask, for the definition of "temporary".

Completed bridges not yet opened to traffic, if rated, are coded as if open to traffic. Typically, such bridges are coded with a condition rating of "9" to indicate an excellent or like new condition.

Refer to Appendix G for further guidance to inspectors on actions required when condition codes of 4 or less are given to the NBI condition ratings.

BRIDGE DECK COMMENTARY

ITEM 58—DECK

This item identifies the overall condition grade of the deck using NBI grading of "0" through "9". If the structure is a culvert, then this item will be coded "N". Due to different grading criteria, concrete, steel, and timber structures will be graded differently. When no girders are present then the deck and superstructure are given the same condition grade. Wearing surface, joints, expansion devices, curbs, sidewalks, parapets, fascias, bridge rails, and drainage devices are not considered to be part of the overall condition grade. The overall condition of the deck should only consider the structural integrity of the deck and its capacity to carry traffic.

DECK-STRUCTURAL CONDITION

Typical Types. Listed below are typical types of bridge decks.

1. Concrete with separate wearing courses
2. Concrete with integral wearing courses
3. Concrete with or without stay-in-place-forms
4. Open and filled steel grating
5. Metal orthotropic
6. Timber

What to Look For. On concrete deck slabs, check for scaling, spalling, cracking, efflorescence, dampness, potholing, delamination, chloride contamination, full or partial depth failures and leakage. Frequently leakage appears on steel supporting members indicating that deck deterioration is taking place. Look very closely at the underside of the deck along curb lines, near joints, and at other low areas of the deck where deterioration normally starts.

When rating concrete deck slabs, remember that concrete deterioration normally starts at the top of the deck and along its periphery. From these locations the deterioration progresses downward and inward until the entire slab is involved. Therefore, when minor deterioration is observed on the bottom of a slab, there is a good chance that the deterioration is much worse above this point and the slab is rated accordingly.

For concrete decks with stay-in-place forms, inspect the forms and supporting beams for rust and other signs of leakage coming through the deck.

With open steel grating decks, look for broken welds and rivets. Check alignment and profile of open and filled grating decks. Look to see that gratings are properly bearing on supporting members. Check the grating for cracks and listen for the sound of loose grating as traffic crosses the bridge.

On orthotropic decks, check for leakage, corrosion, loss of section, and proper support.

Timber decks are observed for looseness, dampness, decay, splitting, crushing, fastener failure and wear. Especially close attention is given to locations where timber decking rests on other members. These areas hold water and are frequently damp and especially vulnerable to decay.

Observe all decks with the passage of live loads. Look for excess deflection and listen for any unusual sounds with the passage of live loads.

EXPANSION JOINTS/DEVICES

Typical Types. Typical types of deck joints are listed below:

1. Steel finger joints
2. Sealed armor joints
3. Unsealed armor joints
4. Steel angle joints
5. Proprietary sealed joints

Exceptions: Bridge types such as rigid frames and filled arches have no joint with the deck. Certain construction details also result in no joint with the deck. Figure 4 shows a typical joint with deck. Figure 5 shows a detail that has no joint with deck.

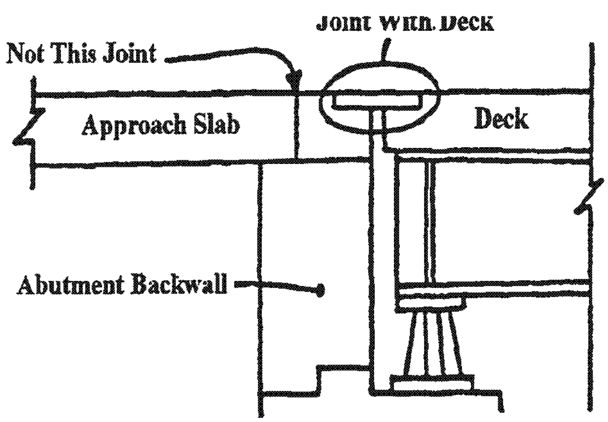


Figure 4: Joint with Deck.

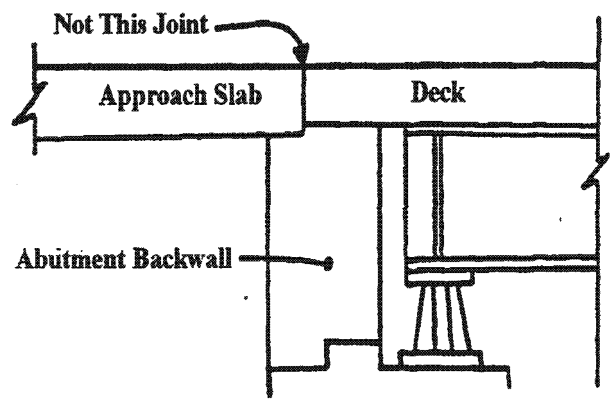


Figure 5: No Joint with Deck.

What to Look For. Check that the size of opening is reasonable and that there are no horizontal or vertical displacements of the joint or its elements. Also, check for horizontal misalignment. Look for debris in the joint or the joint trough and for deterioration of the joint materials. When under the deck, check for deterioration of the joint supports, deterioration or displacement of troughs and baffles.

SUPERSTRUCTURE COMMENTARY

ITEM 59—SUPERSTRUCTURE

This item identifies the overall condition grade of the superstructure using NBI grading of “0” through “9”. If the structure is a culvert, then this item will be coded “N”. The structural members are to be inspected for any signs of distress which may include cracking, deterioration, section loss, malfunction and misalignment of bearings. Due to different grading criteria, concrete, steel, and timber structures will be graded differently. The overall condition grade is made independent of the condition of the deck unless the deck is integral with the superstructure. On bridges where the deck is integral with the superstructure, the superstructure condition grade may be affected by the deck condition. The resultant superstructure condition grade may be lower than the deck condition grade where the girders have deteriorated or been damaged. The condition of bearings, joints, and paint is not included in the determination of the overall condition of the superstructure except in extreme situations.

Fracture critical members (FCMs) are given particularly close consideration since failure of these elements could lead to the collapse of a span or the entire bridge. Their condition grade has a significant influence on the overall condition rating assigned to the superstructure. FCMs are discussed further in the FCM section of this manual.

BEARING DEVICES

Typical Types of Bearing Devices.

1. Fixed steel bearings
2. Steel rocker bearings
3. Steel or bronze sliding plate bearings
4. Steel roller nests
5. Pot bearings

Typical Types of Pads.

1. Elastomeric (rubber like material)
2. Fabreeka (tightly woven fabric impregnated with an elastomeric compound)
3. Teflon/Steel (teflon coated steel)

What to Look For.

1. Steel Bearings: Look for heavy rust, lateral or vertical displacement (uplift), sheared bolts, cracked welds, rockers extended beyond their proper position for the temperature, and the presence of debris which may prevent free movement. Where the bearing is subject to uplift, check for excessive movement or "hammering" when a heavy vehicle crosses the bridge.

2. Pads: Look for delamination, cracking, deterioration, and excessive distortion. When the distortion of an elastomeric bearing exceeds 25% of its height, it is considered excessive.

3. Anchor Bolts: Where the bearings must resist uplift forces, each anchor bolt is struck with a heavy hammer to determine if it has sheared off. The hammer blow should

produce a solid or ringing sound if the bolt is in good condition.

4. Hangers: Hangers may be fracture critical (where a single fracture can lead to catastrophic collapse) or redundant; depending on the number of hangers supporting a member and the redundancy of the supported members.

All hangers are susceptible to failure by cracking since they are subjected to both direct tensile and bending stresses. Hangers with only one pin (either top of bottom) are especially prone to cracking failure.

Hanger stresses are increased by corrosion at the pin/hanger interface, by stress-risers (such as deep corrosion pits, notches, and tack welds), and by section loss from corrosion. If these conditions are observed they should be documented during the inspection.

Each hanger is given a thorough visual inspection to verify its freedom from cracks and the problems enumerated above. The alignment of the suspended member is checked to insure the hangers are not being subjected to racking forces and that any windlocks or guide plates are functioning properly. Cracks are promptly reported to the chief bridge inspector, maintenance engineer or county engineer as appropriate. Problems should be documented by photographs, sketches, and comments.

STRINGERS, GIRDERS, BEAMS, & DECK SLABS

The following bridge elements are considered the superstructure's primary structural members:

1. Stringers
2. Girders
3. Floor beams and floortrusses
4. Main trusses
5. Stems of concrete T-beams
6. Jack arches
7. Box girders
8. Rigid frames
9. Cables and suspenders on suspension bridges
10. Filled arches
11. Arch ribs, spandrel columns and spandrel walls
12. Plates or members welded to the above members
13. Pipes
14. Connections between primarymembers

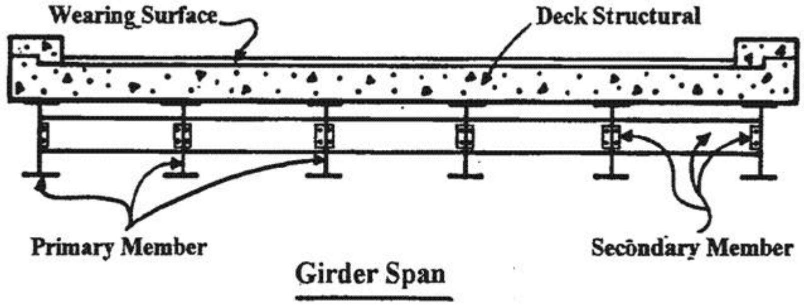
Primary Members may be constructed of many different materials. Some of these different materials are listed below:

1. Concrete
2. Prestressed concrete
3. Stone
4. Brick
5. Steel
6. Aluminum
7. Wrought iron

8. Cast iron
9. Wire rope
10. Timber

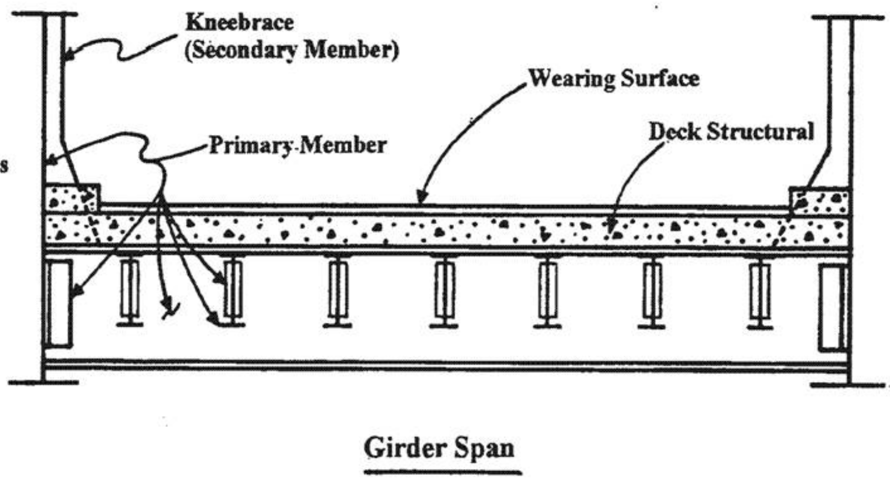
GIRDER BRIDGE

Primary Member	Secondary Member
Girder	Diaphragm



GIRDER BRIDGE

Primary Member	Secondary Member
Stringers	Knee Braces
Floorbeams	
Girders	
Str. / Flbm. Conn.	
Flbm. / Gir. Conn.	



Truss Bridge

Primary Member	Secondary Member
Truss	Portals
Truss Connection	Lacing Bars
Floorbeams	Battern Plates
Truss/Flbm. Conn.	Stay Plates
Stringer	Diagonal Bracing
Str./Flbm. Conn.	

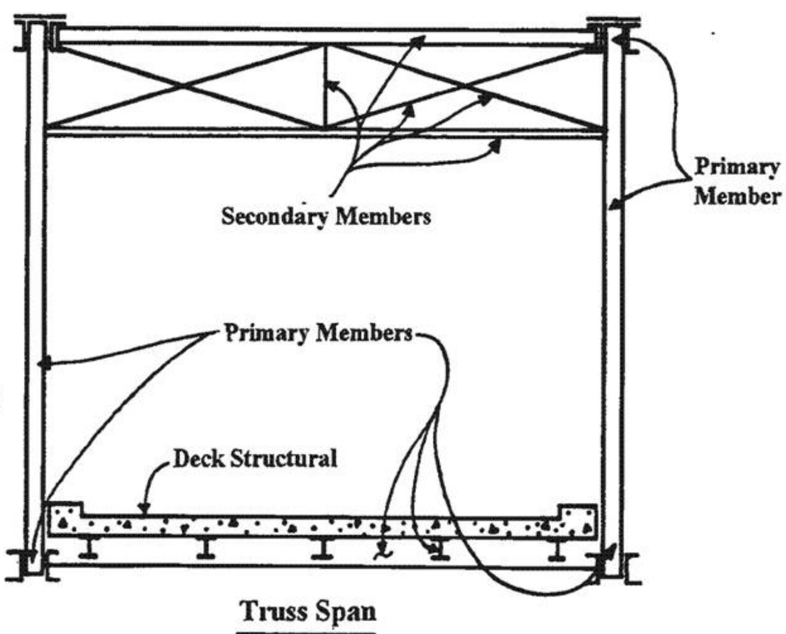


Figure 6: Girder and Truss Type Bridges

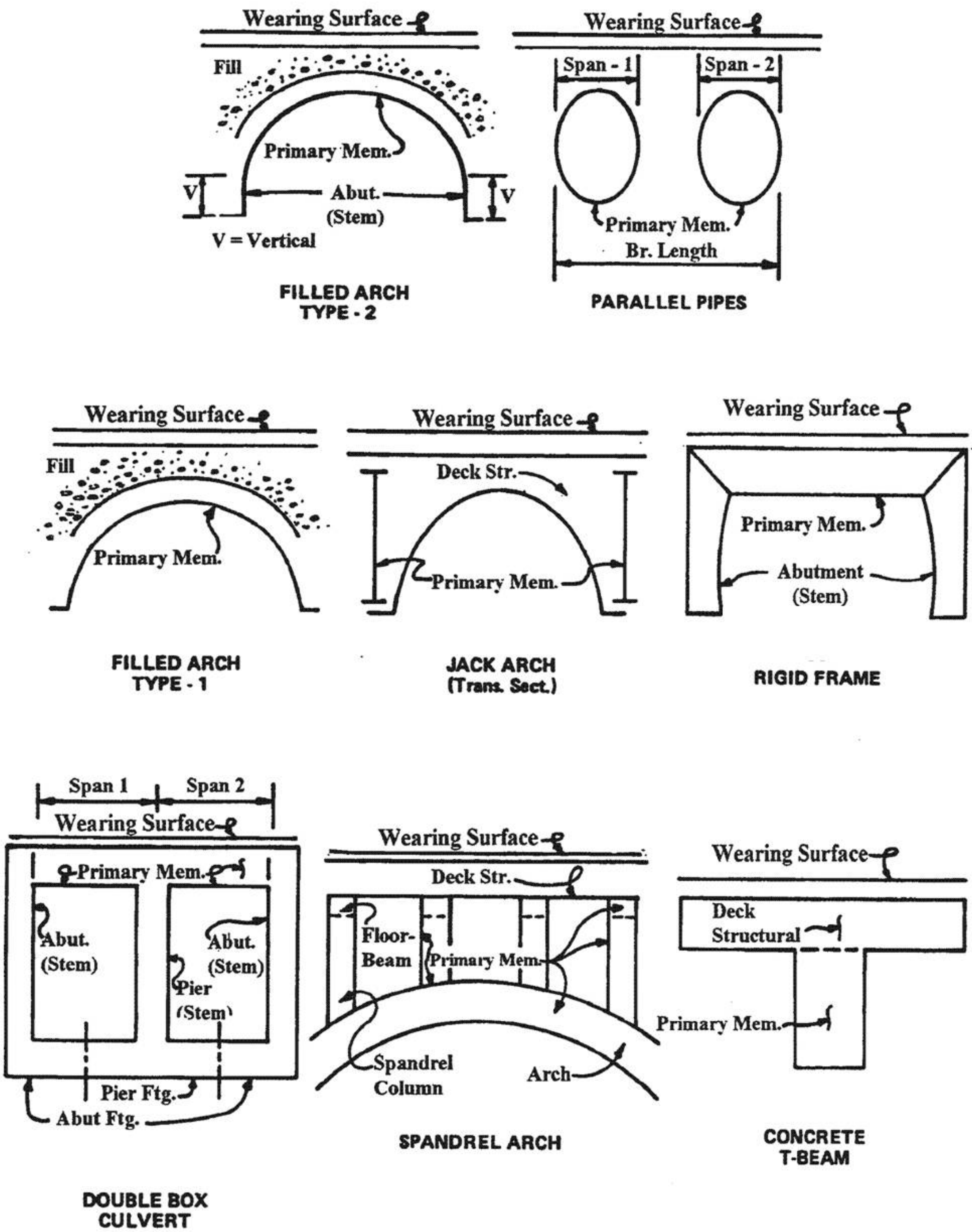


Figure 7: Other Bridge Types.

Primary members are constructed of different materials, and each type of material needs a different approach when evaluating its physical conditions and functional adequacy.

1. General: Examine the alignment and profile of main members. Look for impact damage and damage that may have occurred due to foundation or substructure failure. Observe the behavior of primary members with the passage of live loads. Note any excess deflection, vibration or unusual noise with passage of live loads.
2. Concrete: Inspect concrete members for cracks, spalls, scaling, and efflorescence. Sound the concrete with a mason's hammer. If a hollow sound or dull thud is heard, the concrete is delaminated and deterioration has started.
3. Masonry: When appropriate, check the condition of mortar between masonry elements. The mortar should be firm and intact as opposed to soft, crumbling or missing. Examine the pattern of the masonry elements to determine if movement has occurred. When inspecting masonry arches, determine if any stones appear to be "slipping by one another." Observe masonry elements for deterioration and cracking.
4. Metal: Check for corrosion, cracks, buckles, kinks, and strains due to overstressing. Check connections, connection hardware, fasteners, and welds especially carefully. Look under areas containing debris buildup and other damp areas because these areas are especially vulnerable to corrosion. Examine pins and eyebars on pinned eyebar trusses. Check pins and eyebars for corrosion and cracks. Also check the tightness of the pin nuts, etc.
5. Timber: Inspect timber members for decay, weathering, insect attack, splitting, and fire damage.

The inspection ratings are closely tied into the degree of material deterioration apparent in the primary member, as well as the extent to which the primary member retains its original design structural capacity.

For example, a primary member with no evidence of material decay, and performing at full-design capacity is given a high rating. Where the primary member exhibits isolated areas of minor types of material decay, as defined herein, but it's still not to the degree where there is any significant effect on the member's ability to perform at original design capacity, a rating of "6" (minor deterioration, and satisfactory condition) is appropriate. When the primary members have extensive, serious material deterioration, or the primary member system can no longer achieve its full original design capacity, but still able to react elastically to loadings while retaining some degree of its original load-carrying capacity, a rating of "3" or "4" is appropriate. Should the primary member system lose practically all capacity to sustain the original design loadings, an inspection rating of "2" (critical condition) is applied.

An important consideration in rating the NBI condition is how any material deterioration, or capacity reduction in individual structural elements, relates to the performance of the superstructure as a whole. This is a function of the structure type and the nature and extent of the deterioration. Although an individual primary member may warrant a low inspection rating, for example "3", the overall NBI condition rating on the BI-5 form may receive a higher rating, such as "4" or "5," if the deficient member is not critical and the structure as a whole continues functioning in an elastic manner. One example of this would be an impacted fascia beam on a multi-stringer bridge where the interior stringers are in good condition and continue to function as designed. This allows the superstructure as a whole to retain its original flexural capacity, although the isolated fascia stringer has suffered significant structural damage.

The opposite situation can also occur where a small sized deficiency can be so critical as to require a very low rating for the primary members for the entire span. For example, a primary member on a truss bridge with 12 mm diameter hanger rods each having 6 mm section loss at the connection points are rated very low, such as "3" or "2," even if all of the other primary members on the bridge are in good condition.

In the case of a steel primary member partially or completely encased in concrete, the condition of the encasement and the primary members not encased, if any, will be the basis for the primary member rating. When rating an encased member, a note is included in the inspection report indicating the presence of the encasement and stating the limitations of and basis for the ratings. Further investigation is appropriate if the bridge inspector has reason to believe that there may be a serious deficiency that could only be determined by removing the encasement.

FLOOR BEAMS

What to Look For. Depending on the material of which the floor beam is constructed, look for the distress signs pertinent to each material as discussed in the previous subitem. Close attention should be paid to the following floor beam items during each inspection.

1. Inspect the floor beam members along the deck bearing surface to see if the lower surface of the deck bears uniformly without crushing.
2. Examine the floor beam members at their support points to see if there is adequate bearing area on the support and to see if crushing has occurred.
3. For concrete floor systems, inspect the contact surface between slabs and beams to see if there is good contact between the two and if spalling is occurring in either the slab or the beam.
4. Examine the bottom of concrete floor beams for cracking which may indicate probable overstressing.
5. Examine steel floor beams at all connections. These connections are particularly vulnerable to corrosion due to their exposure to moisture and chemical agents draining off the roadway. The same corrosive condition may exist along the upper flanges which support the deck slab.
6. Inspect floor system connections for tightness.
7. Inspect floor beams for cracks in all the web areas.
8. Record excessive sagging, twisting, or canting of floor beams.

DIAPHRAGMS & CROSS FRAMES

What to Look For. For concrete members, inspect for scaling, spalling, cracking, efflorescence, dampness and other signs of concrete deterioration. Sound the concrete with a hammer. If it gives off a hollow sound, the concrete is deteriorating and is rated accordingly.

Inspect steel members for loss of section due to corrosion or cracking and for secure connections.

TRUSSES-GENERAL: PORTALS AND BRACING

What to Look For. Examine the lateral bracing on the underside of a bridge. Look for section loss due to corrosion or cracking. Check the connections and the alignment of the bracing. Are the connections secure? Is the alignment improper?

Check all bracing members for rust, especially on horizontal surfaces such as those of lateral gusset plates and pockets without drains or with clogged drains. Check for rust around bolt and rivet heads.

Check for bent or twisted members. Since many of these bracing members work in compression, bends or kinks could significantly reduce their effectiveness. Since portals and sway braces can restrict clearances, they are particularly vulnerable to impact damage from high loads.

Where lateral bracing is welded to girder flanges, inspect the welds and flanges for cracking.

Observe transverse vibration or movement of the structure under traffic to determine adequacy of lateral and sway bracing.

MACHINERY (MOVABLE SPANS)

Operating machinery of movable bridges is essentially a power transmission train whose purpose is to transmit input energy and convert it to a form that causes the bridge to rise, descend, or swing. The major elements of operating machinery are:

1. An energy source, for instance an electric motor, internal combustion engine, hydraulic motor, etc.
2. A series of gears and shafts or chains and sprockets
3. A member, normally called a rack pinion, engages a companion piece called a rack thereby introducing motion to the span.

Typical Types. The great majority of movable bridges can be classified into three general groups as listed below.

1. <u>Swing Span</u>. Swing span bridges open by rotating the movable span about a vertical axis so that the span is parallel with the navigation channel. When in the closed position (closed to marine traffic), the span is supported by three piers. The pivot pier supports the weight of the swing span itself. The rest piers stabilize the span and, along with the pivot pier, support the live load (the weight of vehicular traffic) as it passes over the bridge.

2. <u>Vertical Lift</u>. Vertical lift bridges consist of a rigid horizontal movable span supported between two towers. The movable span remains horizontal at all times. There are two popular types of vertical bridges, usually referred to as *tower drive* and *span drive*. The names come from the location of the machinery used to raise and lower the span. Tower drives have the machinery at the top of each tower, while span drives have the machinery on the movable span.

3. Bascule. The most popular type of movable bridge used for highway bridges is the bascule bridge. This type of bridge provides unlimited clearance for marine traffic. Among bascule bridges, the most popular type is the *trunnion* bascule. Other types of bascule bridges are *rolling lift* and *heel trunnion*. In bascule bridges the leaf (movable portion of the span) lifts up by rotating vertically about a horizontal axle (trunnion) which is connected to an approach pier or abutment.

What to Look For. Inspect the following movable bridge:

1. Check machinery for:
    a. Excessive vibration
    b. Missing, broken or loose mounting brackets, lug bolts and nuts
    c. Misalignment of shafts, gears, drums or sheaves
    d. Worn (or loose) shafts, gears, and keys
    e. Accumulation of dirt and debris
    f. Missing, loose or damaged shields or covers over bearings, gears or moving parts
    g. Adequate protection against drainage water
    h. Alignment, positive locking, linkage of wedging and locking equipment
    i. Overheating
    j. Operation of brakes, buffers, and limit switches

2. Check motors or engines for:
    a. Excessive vibration
    b. Wear, uneven bearing surfaces, or slippage in drive train as applicable to the type of drive encountered
    c. Speed control device operation
    d. Improper exhaust system
    e. Improper location of fuel tank
    f. Corrosion of metal surfaces
    g. Water and debris accumulation
    h. Leaks in fuel tank
    i. Improper lubrication

3. Check gear system for:
    a. Improper and inadequate lubrication
    b. Misalignment and looseness
    c. Proper contact of gear tooth surfaces
    d. Excessive gear tooth wear
    e. Pitting, abrasion, scouring, spalling, and galling of gear tooth surfaces
    f. Cracks in metals
    g. Corrosion or moisture on surfaces
    h. Dust and debris accumulations on teeth
    i. Metal fatigue from excessive use
    j. Bent gear shafts
    k. Missing covers

RIVETS OR BOLTS

What to Look For. Inspect rivets and bolts for corrosion and other forms of material degradation. Check for tightness by tapping with a hammer and observing movement. Loose bolts or rivets which allow excessive movement in the connection are rated low. Excessive movement in a connection allows for repeated impact loading and will eventually result in fatigue failure.

WELDS-CRACKING

Although "hands-on" inspections are required for all structures, it is of significantly greater importance that steel structures be examined very thoroughly. All connections and welds must be carefully inspected and evaluated. Recent experience with some types of designs and specific fabrication details has shown that cracks in welds and failures in connections will occur. It is therefore of the utmost importance that the inspector utilize all reasonable care in inspecting welded members and structures.

What to Look For. Inspect welds closely for cracks and soundness. Particular attention should be given to any nonuniform weld, or welds with unusual profiles. Examine welded connections for cracks in the welds and the connecting members. Look for cracks along the length of the cover plate weld. Intermittent welds between the web and tension flange are also susceptible to cracking along their length. Refer to the "Fracture Critical Members and Fracture Critical Bridges" section of this manual for other locations and details which should be inspected closely.

COLLISION DAMAGE

What to Look For. Look for evidence of collision damage by trucks, cars, buses, derailed railroad cars, water traffic, etc. Damage will be evident in the form of shattered timber, sagging or buckled steel members, or large longitudinal cracks in beams or girders. Shattered or missing concrete may also indicate collision damage. Give location and extent of damage and determine if immediate repairs are necessary.

DEFLECTION UNDER LOAD

What to Look For. Observe the center span deflection during the passage of heavy loads. Even though this is a subjective evaluation, inspectors determine to their satisfaction that the deflections are not excessive.

ALIGNMENT OF MEMBERS

What to Look For. Observe superstructure members to determine if they have retained their original "as- built" orientation, i.e. parallel to the structure centerline.

VIBRATION UNDER LOAD

What to Look For. Determine the extent of vibration by standing on the bridge during the passage of heavy loads. Try to distinguish between both vertical and transverse movement. Also consider the length of time the bridge vibrates after the vehicle has passed off of the bridge.

SUBSTRUCTURE COMMENTARY

ITEM 60—SUBSTRUCTURE

This item identifies the overall condition grade of the substructure using NBI grading of "0" through "9". If the structure is a culvert, then this item will be coded "N". The overall condition rating of the substructure is made independent of the deck and superstructure. For non-integral superstructure and substructure units, the substructure is considered as the portion below the bearings. For structures where the substructure and superstructure are integral, the substructure is considered as the portion below the superstructure. Piers, abutments, piles, fenders, and footings are to be inspected for any signs of distress including evidence of cracking, section loss, settlement, misalignment, scour, collision damage, and corrosion. Due to different grading criteria, concrete, steel, and timber structures will be graded differently. Depending on what Item 113 - Scour Critical Bridge is coded; scour issues may have a significant impact on the overall condition grade of the substructure.

If underwater inspection is required, refer to the underwater section of this manual for further guidance in coding this item.

ABUTMENTS

The term "abutment" is usually applied to the substructure units at the ends of a bridge. The function of an abutment is to provide end support for the bridge and retain the approach embankment. Some common types of abutments are full-height, stub, semi-stub, and open (also known as spill-through). Figure 60-2 shows three types of abutments.

Abutments may be constructed of plain concrete, reinforced concrete, steel, timber, stone masonry, or a combination of concrete and stone masonry. Plain concrete and stone masonry abutments are usually gravity structures, while reinforced concrete abutments are mostly cantilever or counterfort types.

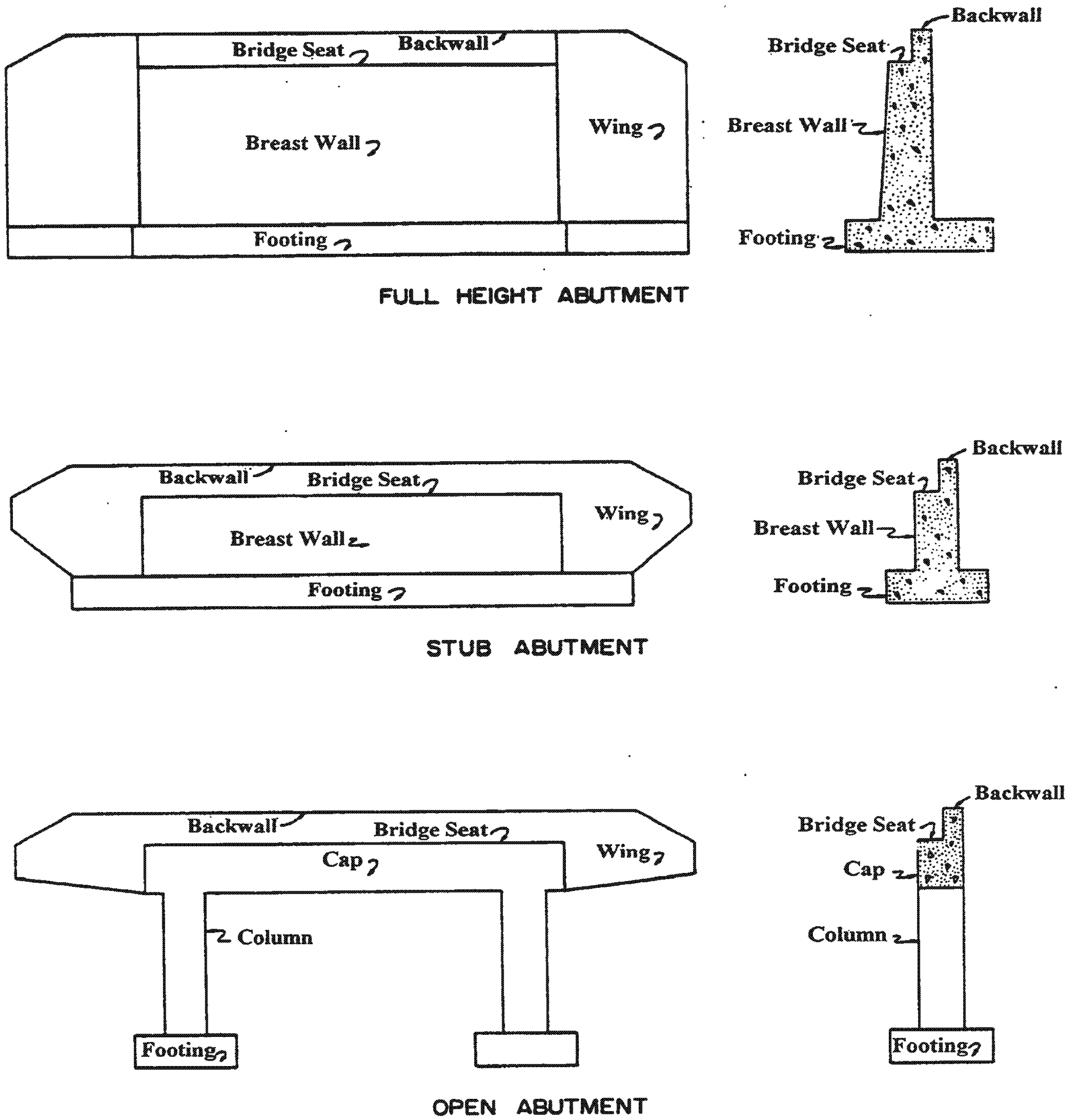


Figure 8: Types of Abutments

What to Look For. Check for scour or erosion around the abutment, and for evidence of any movement (rotational, lateral, or vertical). Measure alignment of abutment using surveying equipment, or plumb bob and tape. Measure clearance between beam and backwall. Off-centered bearings, and inadequate or abnormal clearances between beams and backwall are indications of probable movement.

Determine whether drains and weepholes are clear and functioning properly. Seepage of water through joints and cracks may indicate accumulation of water behind the abutment. Report any frozen or plugged weepholes. Mounds of earth immediately adjacent to weepholes may indicate the presence of burrowing animals.

Check bearing seats for cracking and spalling, especially near the edges. This is particularly critical where concrete beams bear directly on the abutment. Check bearing seats for presence of debris and standing water.

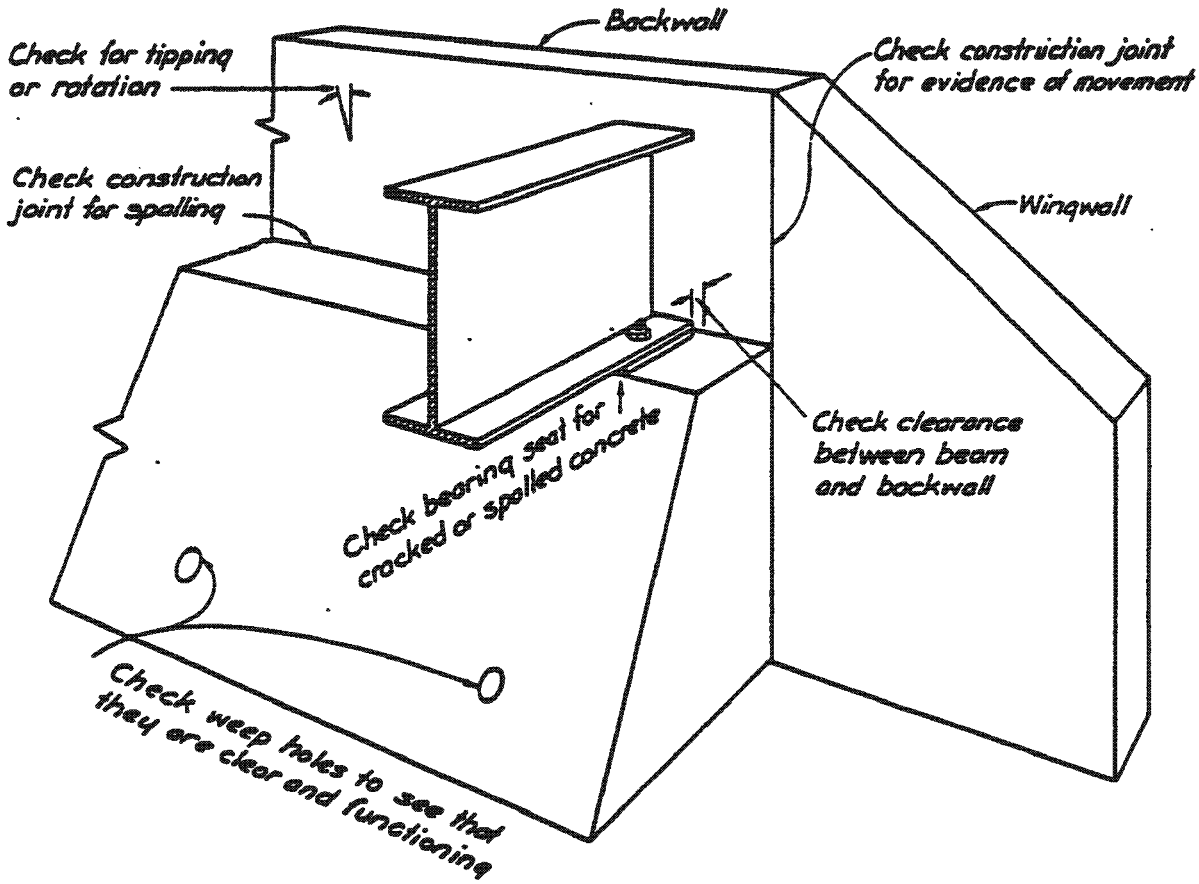


Figure 9: Abutment Checklist Items.

Check for deteriorating concrete in areas that are exposed to roadway drainage. This is especially important in areas where deicing chemicals are used.

Check backwall for cracking and possible movement. Check particularly the joint between the backwall and the abutment.

Check stone masonry for mortar cracks, vegetation growth, water seepage through the cracks, loose or missing stones, weathering, and spalled (or split) blocks.

Probe or pick timber with a knife, ice pick, or prying tool for signs of deterioration such as:

1. Fungus decay
2. Insect attack
3. Weathering
4. Wear

Figure 9 summarizes several checklist items for abutments.

Common Problems. Abutment problems can be classified in general as:

1. Rotational movement or tipping
2. Lateral movement or sliding
3. Vertical movement or settlement
4. Failure of materials

<u>Rotational movement</u> is usually caused by:

a. Scouring
b. Backfill saturated with water
c. Erosion of backfill alongside of abutment
d. Improper design (foundation failure)

<u>Lateral movement</u> is usually caused by:

a. Slope failure
b. Seepage
c. Changes in soil characteristics - saturated clay, frost action, ice, etc.
d. Improper design

<u>Vertical movement</u> is usually caused by:

a. Soil bearing failure
b. Consolidation of soil
c. Scour
d. Cracks
e. Insect and fungus attacks (for timber abutments)
f. Improper design

<u>Failure of materials</u> is usually caused by:

a. Standing water
b. Poor bridge drainage
c. Mortar cracks
d. Missing stones
e. Insect and fungus attack (for timber abutments)
f. Scour

PIERS AND BENTS

Piers and bents provide intermediate support to the bridge superstructure. They may be made of plain or reinforced concrete, stone masonry, steel, timber, or a combination of these materials. Figures 10, 11, and 12 illustrate the common types of piers and bents.

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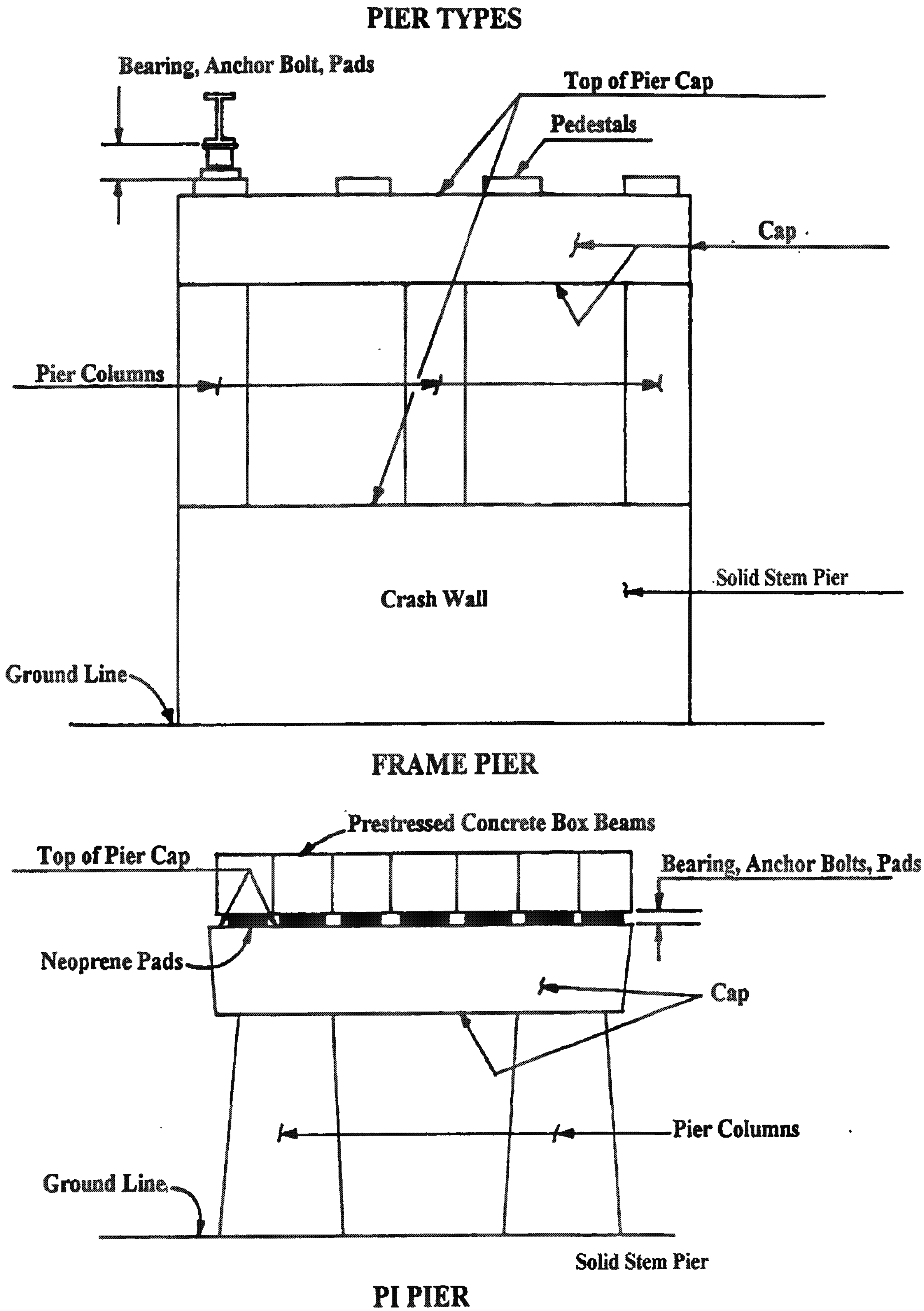
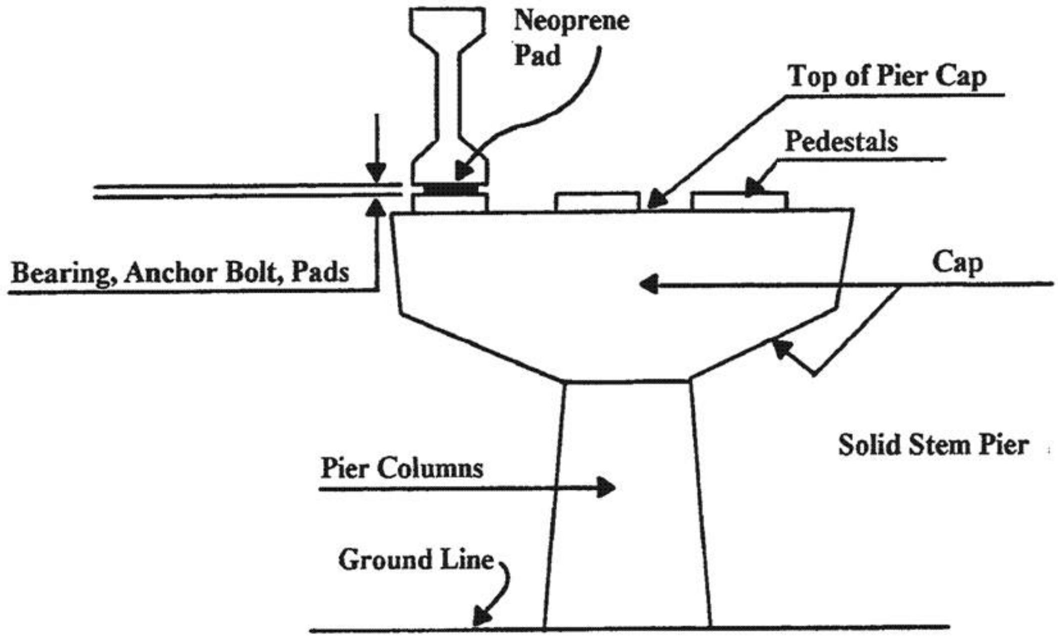
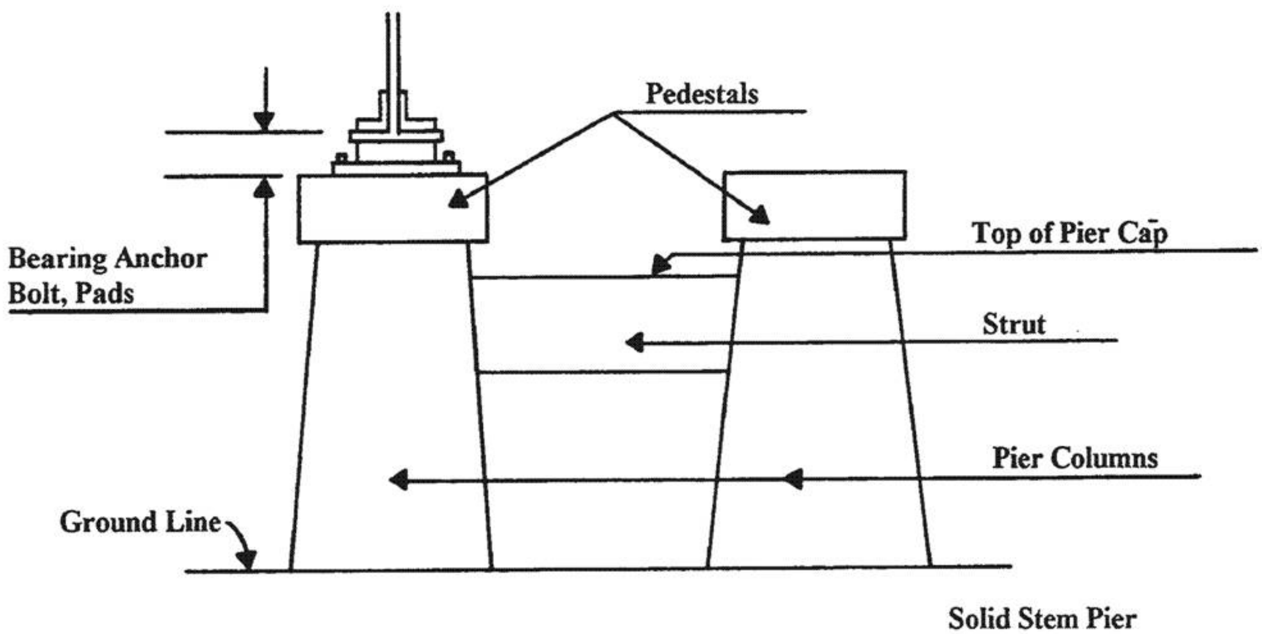


Figure 10: Types of Piers

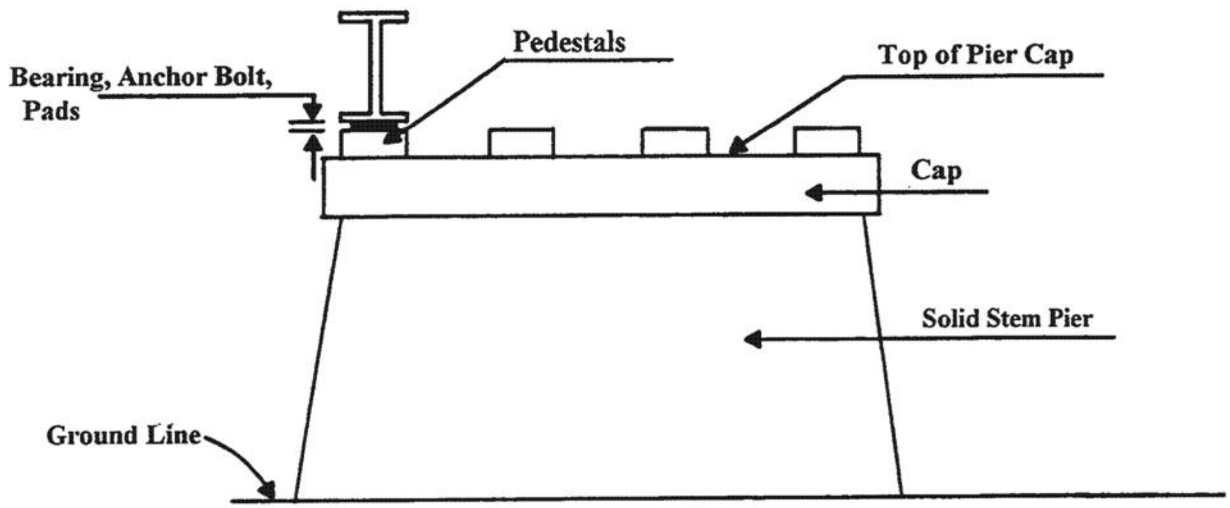


HAMMERHEAD OR "T" PIER

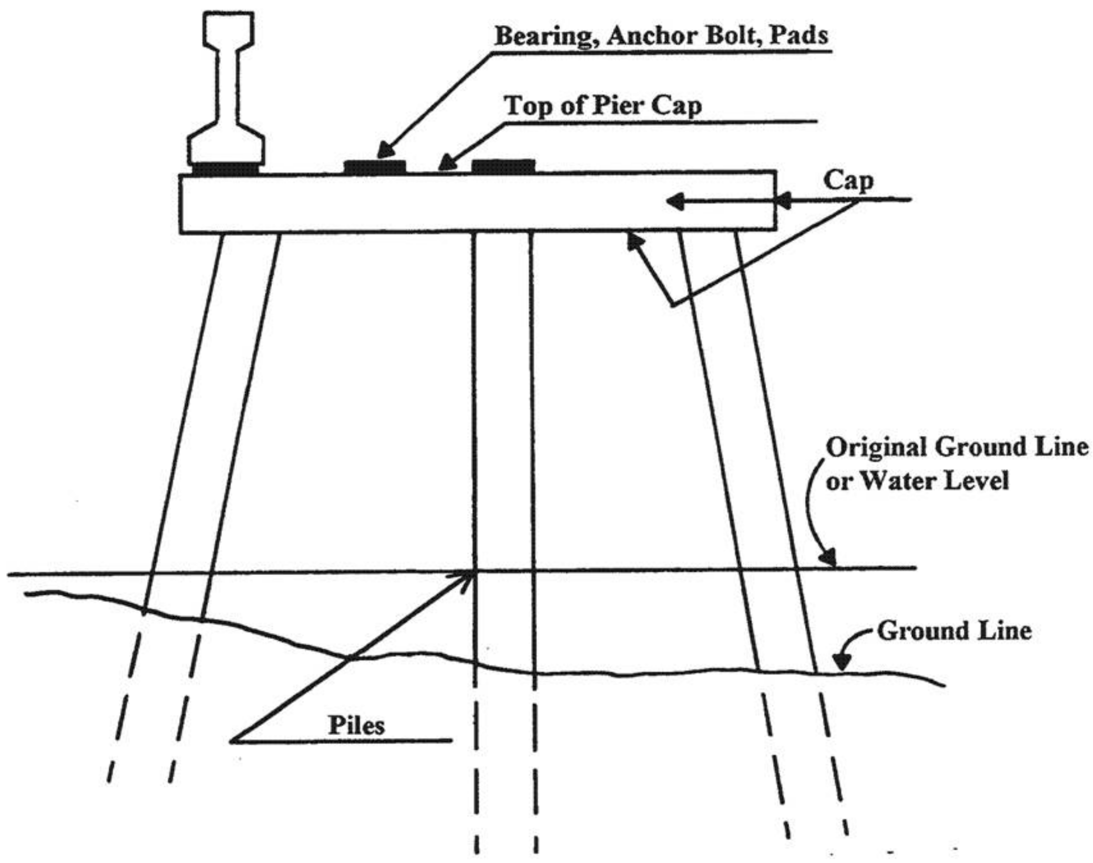


COLUMN PIER WITH STRUT

Figure 11: Types of Piers



SOLID PIER



PILE BENT

Figure 12: Types of Piers

What to Look For. Check for erosion or undermining of the foundation by scour, and for exposed piles. When necessary, conduct an underwater investigation to determine:

1. Deterioration of construction materials
2. Loss of protective stone facing
3. Indication of movement
4. Buildup on piling

Check for evidence of tilt or settlement. Measure amount of pier or bent movement (misalignment) using surveying tools and determine type of movement.

Check for disintegration of the concrete, especially in the splash zone, at the water line, at the ground line, and wherever concrete is exposed to roadway drainage.

Check the pier columns and caps for cracks. Check the bearing seats for spalling and cracking. Stone masonry piers and bents are examined for mortar cracks, water and vegetation in the cracks, and for spalled, split, loose or missing stones

Check steel piers and bents for corrosion, especially at joints and splices. Bolt-heads, rivet-heads, and nuts are very vulnerable to rust, especially if located underwater or at the base of a column.

Examine grout pads and pedestals for cracks, spalls, or deterioration. Check steel piles both in the splash zone and below water surface. If pier and bent members are structurally damaged, investigate if this was caused by collision or overstress (i.e. flange of pile dented during driving).

Where steel cap girders and continuous longitudinal beams are framed together, check the top flanges, welds, and webs for cracking.

Observe and determine if unusual movement occurs in any of the bent members during passage of heavy loads.

Where rocker bents are designed to rotate freely on pins and bearings, check to see that such movement is not restrained. Restraint can be caused by severe corrosion, the presence of foreign particles, or misalignment for the rocker.

Determine if any earth or rock fills have been piled against piers causing loads not provided for in the original design and producing unstable conditions.

For timber piers and bents, pay particular attention to damages caused by decay, weathering, fungus, or insect attack.

Pile Bents. Pile bents are transverse structural frameworks composed of piles and pile caps. The cap distributes the superstructure load to the piles and ensures that the piles act together. Pile bents function as abutments or piers. When used as abutments the piles are usually completely below ground and the cap is cast integrally with the deck slab. Pile bents may be made of concrete, timber or steel.
What to Look For. Depending on the materials of which the structures are constructed, look for the distress signs discussed below:

1. Concrete

a. Check bearing seats for cracked or spalled concrete.
b. Check cap for deteriorated concrete and cracks.
c. Check piles for cracked, spalled or disintegrated concrete, especially at the waterline or groundline.
d. Check piles for plumbness.
e. Check for erosion or undermining of the foundation by scour *(refer to as-built foundation data and streambed cross section data).*
f. Check for evidence of tilt, settlement, or misalignment.

2. Steel

a. Check the pile bents for the presence of rust, especially at the ground level line. Over water crossings, check the splash zone and the submerged part of the piles for rust.
b. Check for debris around the pile bases. Debris will retain moisture and promote rust.
c. Check the steel caps for rotation due to eccentric connections.
d. Check the bracing for broken connections and loose rivets or bolts.
e. Check the condition of web stiffeners.

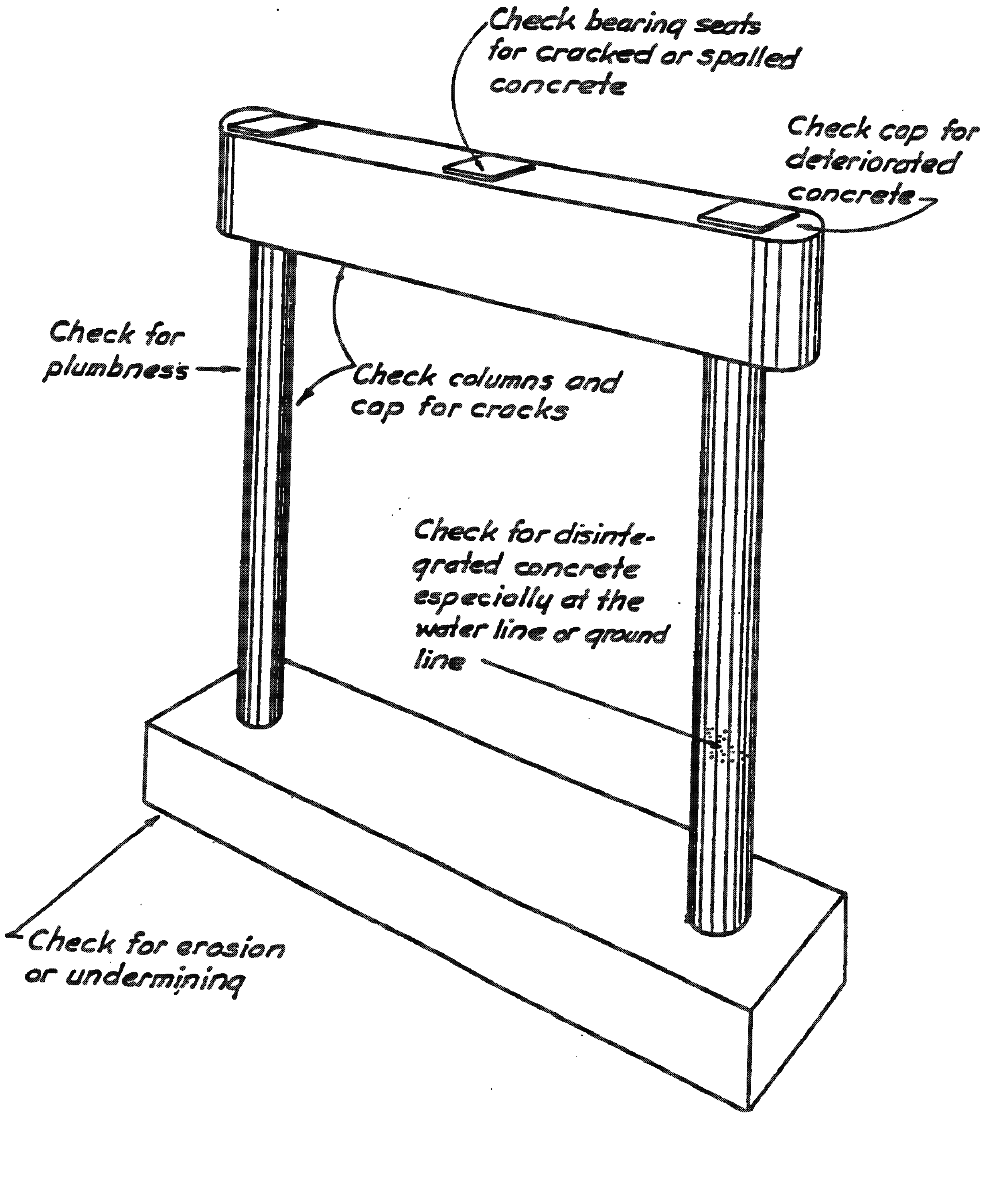


Figure 13: Concrete Pier and Bent Checklist Items

3. Timber

a. Check for decay in the piles, caps, and bracing. The presence of decay may be determined by tapping with a hammer to detect soft or unsound areas or by test boring the timber. Check specifically at the groundline, or waterline, and at joints and splices, since decay usually begins in these areas.
b. Check splices and connections for tightness and for loose bolts.
c. Check the condition of the cap at those points where the beams bear directly upon it, and at those points where the caps bear directly upon the piles. Note particularly any splitting or crushing of the timber in these areas.
d. Observe caps for excessive deflection under passage of heavy loads.
e. Check timber piles in salt water or marine environment to determine damage caused by marine borers and shipworms.
f. Check for rotted or damaged timbers in the backwalls of end bents (function as abutments).

COLLISION DAMAGE

What to Look For. Look for evidence of collision damage by trucks, cars, buses, derailed railroad cars, water traffic, etc. Damage will be evident in the form of shattered timber, sagging or buckled steel members, or large cracks in piers and other substructure members. Shattered or missing concrete may also indicate collision damage. Give the location and extent of damage and determine if immediate repairs are necessary.

CHANNEL AND CHANNEL PROTECTION COMMENTARY

ITEM 61—CHANNEL AND CHANNEL PROTECTION

This item identifies the overall condition grade of the channel and channel protection devices. If the structure is not over a waterway, then this item will be coded "N". The overall condition grade is associated with the stream stability and the condition of the channel, riprap, or slope protection. The accumulation of drift and debris on the superstructure and substructure is not considered in the overall condition grade but noted on the inspection forms.

GUIDELINES FOR CODING ITEM 61—CHANNEL AND CHANNEL PROTECTION

Rate and code the condition of each subitem under Item 61 using the following codes and descriptions.

Code	Description
N	Not applicable. Use when bridge is not over a waterway.
6	There are no noticeable or noteworthy deficiencies which affect the condition of the channel.
8	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 little or 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 waterway slightly.
5	Bank protection is being eroded. River control devices 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 waterway.
3	Bank protection has failed. River control devices have been destroyed. Stream bed aggradation, degradation or lateral movement has changed the waterway to now threaten the bridge or approach roadway.
2	The waterway has changed to the extent the bridge is near a state of collapse.
1	Bridge is closed because of channel failure. Corrective action may put it back in light service.
0	The bridge is closed because of channel failure. Replacement is necessary.

CHANNEL SCOUR

Scour is defined as the removal and transportation of material from the bed and banks of rivers and streams as a result of the erosive action of running water. Some general scouring takes place in all stream beds, particularly during periods of flood.

What to Look For. Check for erosion of stream banks and increasing channel depths. High water velocities indicate a potential for scour. Check for situations that increase stream velocity, such as siltation in part of the channel, deflection of the stream by protruding substructures, or inadequate openings. Compare new scour documentation and required profiles with previous readings.

EMBANKMENT EROSION

Embankments protruding into wide floodplains may produce scour because the flood flow concentrates at the upstream corners of the embankment. Also the embankment constricts the waterway opening and hence increases the flow velocity.

What to Look For. Check for deterioration of the banks, such as slumping and/or erosion. Also, check for erosion around the bank protection devices or where bank protection devices have failed.

DRIFT

What to Look For. Look for brush, trees and other debris in the channel and on the channel banks. Check both upstream and downstream from the bridge for locations where debris is restricting the channel.

VEGETATION

An effective cover of natural vegetation on channel banks is probably the cheapest form of bank protection. Vegetation prevents soil erosion and hence the deposit of soil onto the channel bed. Check the existing condition of vegetation growth on the stream banks to determine its functional adequacy to prevent scour and erosion of channel banks.

CHANNEL MIGRATION

Channel change is usually due to an artificial or natural alteration in the width, alignment, or profile of the channel. These alterations, which may take place at the bridge site or some distance upstream or downstream, upset the equilibrium of the channel. A channel is said to be in equilibrium if the rate of flow is such that it neither picks up material from the bed nor deposits it.

Channel degradation and scour seriously endanger bridges whose foundations are located in erodible river bed deposits. The problem is compounded if the foundation does not extend to a depth below that of the anticipated scour.

In channels susceptible to degradation and scour, a channel profile is to be taken periodically. Reference is made to the section on "Channel Scour" for this procedure.

What to Look For. Look for changes in the channel by comparing current information with information gathered during previous inspections. Photographs, channel profiles, and other information obtained from underwater inspections are all useful in determining the rating for this subitem.

SPUR DIKES AND JETTIES

A jetty is an artificial wall built out into the water from the bank to restrain currents and to protect the ends of piers and abutments from severe scour. A spur dike is a projecting jetty-like construction placed adjacent to an abutment of the "U", “T", block or arched type on the upstream or downstream side of the structure. It serves the purpose of securing a gradual contraction of the channel width and inducing a free and even flow of water adjacent to and beneath a bridge. Spur dikes also serve to prevent stream scour and undermining of the abutment foundation.

What to Look For. Look for erosion to the banks of the spur dikes or jetties, loss of protective material, and other forms of deterioration which reduce the effectiveness of the spur dike or jetty in functioning as designed.

RIPRAP

Riprap may be stone, brickbat, blocks of concrete, or similar protective material deposited on river and stream beds and banks to prevent erosion and scour by water flow, wave or other movement.

What to Look For. Examine the physical condition of the riprap and determine if they are functionally adequate to prevent erosion and scour of stream beds and banks.

ADEQUACY OF OPENING

Scour and stream bed degradation are usually the result of inadequate waterway areas. In determining waterway adequacy, the geometry of the channel, the amount of debris carried during high water periods, and the adequacy of freeboard are all considered.

What to Look For. Check for upstream flooding resulting from storms or ice jams. This can normally be determined by site history. Long-term local residents may be able to indicate high water levels. Other things to look for are high water marks on trees or painted structures, ice scars, or debris caught in the superstructure. Also, check for man-made or recent natural obstructions in the opening. Stream gauges in the vicinity of the bridge may be useful in rating this subitem.

ALIGNMENT WITH STRUCTURE

Local scour is increased when the substructure is not aligned with the direction of stream current. Also, debris is more likely to be trapped against poorly aligned substructures.

What to Look For. Check the alignment of the substructure with the stream current. Poor alignment typically results from zero skew substructures in a skewed crossing. Other things to look for are debris caught on the substructure and local scour.

CULVERT COMMENTARY

ITEM 62—CULVERTS

This item identifies the overall condition grade of the culvert using NBI grading of "0" through "9". If the structure is a culvert, then Items 58, 59, and 60 will be coded "N". The structural condition, alignment, settlement, joints, and scour are to be inspected, and an overall condition will be given for the culvert. Wingwalls integral to the first construction or expansion joint are included in the evaluation.

GUIDELINES FOR CODING ITEM 62—CULVERTS

Rate and code the condition of each subitem under Item 62 using the codes and descriptions.

Code	Description
N	Not applicable, or use if structure is not a culvert.
9	No deficiencies.
8	No noticeable or noteworthy deficiencies which affect the condition of the culvert. Insignificant scrape marks caused bydrift.
7	Shrinkage cracks, light scaling, and insignificant spalling which does not expose reinforcing steel. Insignificant damage caused by drift with no misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
6	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
5	Moderate to major deterioration or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion ordeep pitting.
4	Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joint permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion ordeep pitting.
3	Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls, or pipes. Metal culverts have extreme

Code	Description
	distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
2	Integral wingwalls collapsed, severe settlement of roadway due to loss of fill. Section of culvert may have failed and can no longer support embankment. Complete undermining at curtain walls and pipes. Corrective action required to maintain traffic. Metal culverts have extreme distortion and deflection throughout with extensive perforations due to corrosion.
1	Bridge culvert closed. Corrective action may put back in light service.
0	Bridge culvert closed. Replacement necessary.

GENERAL DISCUSSION

A culvert is a conduit which conveys stream flow through a roadway embankment or some other type of flow obstruction. It is generally used where its construction would substitute for a bridge without any loss of vital waterway area. Culverts are constructed from a variety of materials and are available in many shapes and configurations. The most commonly used shapes include circular, box (rectangular), elliptical, pipe-arch, and arch. The three most common culvert materials are concrete (plain or reinforced), corrugated aluminum, and corrugated steel.

The following problems are usually associated with culverts. These problems are the end results of a combination of high earth loads, long pipe-like structures, and running water:

1. Foundation movement, which includes settlement, tipping, and lateral movement.
2. Shear or flexural failures in the top slabs of culverts.
3. Undermining, in the form of scour attack on the upstream and downstream ends of culverts.
4. Debris collecting over the mouth of the culvert causing flooding, flotation, and displacement of part or all of the culvert.
5. Water leaving the culvert at high velocities may cause scouring of the streambed. Turbulence at the inlet end may also cause scouring of the inlet streambed.

For metal culverts, determine the condition of the metal by checking the extent of abrasion, pitting, and rust corrosion as well as the physical conditions of riveted and bolted connections.

Examine timber culverts for evidence of deterioration like fungus decay, vermin attack, and abrasion.

For concrete culverts, determine the physical condition of concrete by observing the extent of spalling and abrasion in the barrel, headwalls and endwalls, and concrete floor (if visible). Make notes about the size, length, type, and location of any cracks.

BARREL

What to Look For. Look for evidence of settlement, tipping, and lateral movement of the culvert. This can be accomplished by the following inspection measures:

1. Check to determine if the culvert floor is sagging.
2. Check the profile of the overhead roadway for sagging.
3. Check for vertical, transverse, and longitudinal differential settlement at the expansion joints.
4. Check for canted wingwalls, which may be caused by settlement, lateral movement, or scour.
5. Check for slide failures in the earth fill around the culvert. Such failures are likely to affect the culvert as well.
6. Check for cracks and spalls in the top slab; longitudinal cracks (along the barrel) indicate either shear or flexure problems; transverse cracks (across the barrel) indicate differential settlement; cracks in the sides may be from settlement or from extremely high earth pressures; note the size, length, and location of the cracks.
7. Check for undermining at the ends of the culvert and under the wings.
8. Examine the inside of the culvert for large cracks and debris; also check the ends of the culvert for debris and other types of obstructions.
9. Note any other signs of material deterioration.
10. On large steel, metal, or steel plate culverts, note any depressions or excessive patching on the approach pavement; these conditions may indicate the presence of voids around the walls of the culvert which could contribute to loss of lateral support and eventually to the failure of the culvert. Also depressions/patching of the roadway over the culvert could indicate a sagging culvert.

HEADWALL

Headwalls and wingwalls are common types of end treatments used at culvert inlets and outlets. These end structures may be used to reduce erosion, retain fill material, inhibit seepage, improve hydraulic efficiency, resist uplift, provide structural stability to the culvert ends, improve the culvert appearance, and resist horizontal forces that tend to separate sections of precast culvert pipe.

What to Look For. Culvert end structures like headwalls and wingwalls need to be inspected in terms of their structural, hydraulic, and traffic safety characteristics. Examine the headwalls and wingwalls for any signs of undermining and settlement such as cracking, tipping, or separation of the culvert barrel from the headwall. Settlement places additional stresses on the ends of the culvert and may cause blockage or end failure. Ponding or washing out of the fill could result. Separation of the barrel from the headwall is particularly serious since it exposes the fill material and permits its loss through erosion. The loss of the supporting soil could lead to failure anywhere along the length of the culvert. When inspecting metal headwalls and wingwalls, check for voids behind the walls which may indicate a loss of backfill. Look for erosion adjacent to the toe-wall or wingwalls which may indicate probable scour in front of the wall. Also, check for outward movement of the top which may indicate damage to the anchor rods.

INTERMEDIATE WALL

Intermediate walls only apply to box culverts. For box culverts the intermediate wall is the wall between the barrels of a multiple barrel culvert. The intermediate wall supports the top slab of the culvert slab, similar to the manner that a bridge pier supports the superstructure of a bridge.

What to Look For. Examine the intermediate wall carefully in regard to any material deterioration which reduces its capacity in supporting the top slab and fill.

ADEQUACY

It is essential for a culvert to be able to carry the design discharge without exceeding the headwater depth allowable. If the culvert is blocked with debris or if the stream changes course near the ends of the culvert, the culvert may be inadequate to handle design flows. This may result in excessive ponding, flooding of nearby properties, and/or washouts of the roadway and embankment.

Changes in upstream land use may also affect peak flow rates and stream stability. It is therefore important to inspect the condition of the stream channel and to evaluate the ability of the culvert to handle peak flows.

What to Look For. Inspect the stream channel for conditions that would cause damage to the culvert or surrounding properties. Factors to be checked include culvert location (horizontal and vertical alignment), scour, and accumulation of debris and sediment.

1. Horizontal Alignment - Where sharp channel curves exist at either the entrance or exit of a culvert, check for sedimentation and erosion.
2. Vertical Alignment - Vertical alignment problems are usually indicated by scour or accumulation of sediment. Culverts on flat grades may have problems with sediment buildup at the entrance or within the barrel. Culverts on moderate or steep grades generally have higher flow velocities than the natural stream and may have problems with outlet scour.

DEBRIS

What to Look For. Note any deposits of debris and sediment that could block the culvert or cause local scour in the stream channel. Accumulations of debris and sediment in the stream may cause scour of the stream banks and roadway embankment, or could cause changes in the channel alignment. Excessive ponding may result if the culvert's capacity to discharge stream flow is compromised by debris and sediment deposits at the culvert inlets or within the culvert barrel. Such accumulations could also increase the chances for damage due to buoyant forces. Downstream obstructions which cause water to pond at the culvert's outlet may also reduce the culvert's capacity.

EROSION/SCOUR

Erosion generally refers to loss of stream bank materials and a lateral movement of the channel. Scour, on the other hand, refers to the lowering of the stream bed due to the removal and transport of stream bed materials by flowing water. Scour may be classified as local scour and general scour. Local scour occurs primarily at the culvert outlet. It is usually caused by obstruction or constriction of the stream flow. General scour extends farther along the stream and is not localized around a particular obstruction. It could involve gradual and uniform degradation of the stream bed.

What to Look For. Check the upstream channel for scour that may undermine the culvert or erode the embankment. Erosion of stream banks may produce gravel sediment which could block or reduce the culvert opening. Examine the stream channel below the culvert for local scour caused by the culvert's discharge and for general scour that could eventually threaten the structural integrity of the culvert and roadway embankment.

SETTLEMENT

What to Look For. Check the roadway at the beginning and end of the culvert for possible settlement of the backfill material and the culvert itself. Note any differential settlement that could affect the structural integrity of the culvert. Settlement could be caused by erosion which has undermined the culvert or could be due to settlement of the soil beneath the culvert. Settlement due to undermining is more serious and could lead to possible instability of the culvert.

REMARKS

This section shows notes from the last inspection, and has an area to place new notes.

MISCELLANEOUS

ITEM 71—WATERWAY ADEQUACY

This 1-digit item appraises the adequacy of waterway opening with respect to passage of flow through the bridge. Where overtopping frequency information is available, the tabulated descriptions of chance of overtopping used in the coding for waterway adequacy 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 used in the coding for waterway adequacy mean the following:

Insignificant	—	Minor inconvenience. Highway passable in a matter of hours.
Significant	—	Traffic delays of up to several days.
Severe	—	Long term delays to traffic with resulting hardship.

Tabulated below are rating codes which are used in evaluating this item. Interpolation is used where appropriate. Site conditions may warrant somewhat higher or lower ratings than those indicated by the table.

Item 26 - Functional Classification			
Principal Arterials - Interstates, Freeways, or Expressways	Other Principal and Minor Arterials and Major Collectors	Minor Collectors, Locals	Description
Code			
N	N	N	Bridge is not over a waterway
9	9	9	Bridge deck and roadway approaches above flood water elevations (high water); chance of overtopping is remote.
8	8	8	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

ITEM 72—APPROACH ROADWAY ALIGNMENT

This field identifies those bridges which do not function properly or adequately due to the alignment of the approaches. Code this item based on the adequacy of the approach roadway alignment. It is not intended that the approach roadway alignment be compared to current standards, but rather to the existing alignment of the section of highway the bridge is on. This concept differs from the other appraisal evaluations. Speed reduction due to structure width alone is not considered in evaluating this item.

The individual structure is rated in accordance with the following parameters:

Code	Description
9	Excellent alignment - alignment of approach roadway is superior to the section of road which the bridge is on.
8	Very good alignment - horizontal and vertical curvature are such that no reduction in vehicle operating speed is required from that on the highway section.
7	Good alignment - little or no speed reduction required; both horizontal and vertical curvatures are good in relation to those on the highway section.
6	Satisfactory alignment - very minor speed reduction is required because of horizontal or vertical curvature of the approach roadway.
5	Fair alignment - moderate speed reduction is required.
4	Poor alignment - moderate to substantial speed reduction is required.
3	Serious misalignment - approach roadway alignment is intolerable; substantial speed reduction is required.
2	Critical misalignment - misalignment is such that vehicles must nearly stop to safely cross the bridge.
0	Bridge closed.

ITEM 36A – BRIDGE RAILINGS

Factors that affect the proper functioning of bridge railing include height, material, strength, and geometric features. One of the design features of railings is that they are capable of smoothly redirecting an impacting vehicle away from the traffic in the opposing lanes or other hazardous zones. Check to ensure that this and other design features are functioning properly. The *AASHTO Standard Specifications for Highway Bridges*, calls for railings to meet specific geometric criteria, to be crash tested per FHWA policy, and to resist specified static loads without exceeding the allowable stresses in their elements. Railings that meet these criteria and loading conditions are considered acceptable. Other railings that have been successfully crash tested are considered acceptable even though they may not meet the static loading analysis and geometric requirements. Acceptable guidelines for bridge railing design and testing are also found in the AASHTO *Manual for Assessing Safety Hardware.* (Note, these publications are the current editions at the time this manual was written. Future editions should be used when appropriate.) This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

ITEM 36B – TRANSITIONS

The transition from approach guardrail to bridge railing requires that the approach guardrail be firmly attached to the bridge railing. It also requires that the approach guardrail be gradually stiffened as it comes closer to the bridge railing. Check to ensure that the ends of curbs and safety walks are gradually tapered out or shielded. This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

ITEM 36C - APPROACH GUARDRAIL

Investigate and determine the structural adequacy and compatibility of approach guardrail with transition designs. Rarely does the need for a barrier stop at the end of a bridge. Thus, an approach guardrail with adequate length and structural qualities to shield motorists from the hazards at the bridge site may be appropriate. In addition to safely redirecting an impacting vehicle away from the danger zones, the approach guardrail also facilitates a smooth transition to the bridge railing that will not cause snagging or pocketing of an impacting vehicle. Acceptable guardrail design suggestions are contained in the *AASHTO Roadside Design Guide* and subsequent FHWA or AASHTO guidelines. (Note, these publications are the current editions at the time this manual was written. Future editions should be used when appropriate.) This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

ITEM 36D – APPROACH GUARDRAIL ENDS

As with guardrail ends in general, the ends of approach guardrails to bridges are flared, buried, made breakaway, or shielded. Design treatment of guardrail ends is given in the *AASHTO Roadside Design Guide.* (Note, these publications are the current editions at the time this manual was written. Future editions should be used when appropriate.) This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

LOAD POSTING SIGNS – A) REQUIRED

This field identifies if load posting signs are required for the structure.

LOAD POSTING SIGNS – B) PRESENT

This field identifies if the load posting signs that are required are present at the structure.

LOAD POSTING SIGNS – C) VISIBLE

This field identifies if the load posting signs that are required are visible, and that they are not being blocked by any objects.

LOAD POSTING SIGNS – D) LEGIBLE

This field identifies if load posting signs that are required for the structure are legible, and motorist are able to read the signs while traveling on the roadway.

Inspection Report

FORM: BI-5 STR. NUM.: OIN0085 510010.719+1 Sheet: 2

BIN: 009005 1 REC DIVISION: 06 Printed: 9/4/2014

PREVIOUS DATE: 08/19/2013

NEW DATE: ____________

STRUCTURE UNIT: 1

	ELEM #	ELEMENT NAME	ENV	QUANTITY	UNITS	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
CURRENT:	12	Re Concrete Deck	1	8,140	sq.ft	0.00	3,721.00	4,314.00	105.00
NEW:									
NOTES:		MOD TO HVY DEBRIS ON DECK MOD AGG EXP IN DECK MOD POT HOLES IN DECK, 5' CS4 TRANS CRKS ON DECK, ESP SP#2 AND 4, (63X34)2 , CS3 HVY CRKS IN BOTT OF DECK W/EFFLOR, 30' CS3							
CURRENT:	7358	Concrete Cracking	1	8,140	sq.ft	0.00	3,721.00	4,314.00	105.00
NEW:									
NOTES:									
CURRENT:	110	Re Conc Opn Girder/Beam	1	1,158	ft	0.00	1,158.00	0.00	0.00
NEW:									
NOTES:		CRKS IN GIRS, 1' TO 3' IN DENSITY, ALL CS2							
CURRENT:	7358	Concrete Cracking	1	1,158	ft	0.00	1,158.00	0.00	0.00
NEW:									
NOTES:		_							
CURRENT:	205	Re Conc Column	1	6	each	6.00	0.00	0.00	0.00
NEW:									
NOTES:		GRAFFITI ON COLUMN#2, BT#2							
CURRENT:	215	Re Conc Abutment	1	115	ft	115.00	0.00	0.00	0.00
NEW:									
NOTES:		HL CRKS IN BKWALL @ ABUT#1 & 4 FORMWORK @ ABUTS NEEDS REMOVED							
CURRENT:	234	Re Conc Pier Cap	1	176	ft	174.00	0.00	2.00	0.00
NEW:									
NOTES:		HL CRKS IN CAPS, CS1 SPALL IN CAP @ BT#2, BRNG#6, NO STEEL EXP, 2' CS3							

Figure 14: BI-5 Form – Element Conditions

ELEMENT #

This field identifies the number of the element, protective system, or defect that is being inspected during the inspection.

ELEMENT NAME

This field captures the type of element, protective system, or defect that is being inspected during the inspection.

For more information on Element Condition States, refer to the *Introduction to Element Level Bridge Inspection Workbook*. Element descriptions, units, and quantity calculations for each element can be found in Appendix H.

ENVIRONMENT

Certain environments will cause a bridge to deteriorate faster than others. This field captures the type of environment the bridge is in. The majority of structures in the state of Alabama fall into Environment 1 – Benign. Those subjected to ocean salt or road salt should be placed in Environment 2 – Low. This field contains the parameters listed below:

Code	Description
1	Benign
2	Low
3	Moderate
4	Severe

For more information on Environmental Factors, refer to the *Introduction to Element Level Bridge Inspection Workbook.*

CONDITION STATES

Element condition states describe the current condition of each element. There are 4 defined condition states for each element, that follow general descriptions below:

Condition State	Description
1	Good
2	Fair
3	Poor
4	Severe

The BI-5 form is used to record the total quantity for each element on a bridge and to record the quantity of each element that exists in each of the 4 condition states. The condition states for each element correspond to identified defects and their severity. The BI-5 form should also be used to identify the quantities of the identified defects for each element. Element defects are only used when the element reaches condition state 2, 3, or 4. If multiple defects occur in the same area, the inspector shall record the defect with the worst condition state. If the defects are in the same condition state, the inspector shall determine the predominate defect for reporting.

The following bridge elements, protective systems, and defects that shall be used in evaluating the condition states for all elements on each bridge. The elements, protective systems, and defects are grouped by material type.

Reinforced Concrete

Element Number	Element Name
12	Reinforced Concrete Deck
16	Reinforced Concrete Top Flange
38	Reinforced Concrete Slab
105	Reinforced Concrete Closed Web / Box Girder
110	Reinforced Concrete Open Girder / Beam
116	Reinforced Concrete Stringer
144	Reinforced Concrete Arch
155	Reinforced Concrete Floor Beam
205	Reinforced Concrete Column
210	Reinforced Concrete Pier Wall
215	Reinforced Concrete Abutment
220	Reinforced Concrete Pile Cap / Footing
227	Reinforced Concrete Pile
234	Reinforced Concrete Pier Cap
241	Reinforced Concrete Culvert
331	Reinforced Concrete Bridge Railing
321	Reinforced Concrete Approach Slab

<table>
<tr><th colspan="5">Reinforced Concrete - Condition State Definitions</th></tr>
<tr><th>Defect</th><th>CS 1 - Good</th><th>CS 2 - Fair</th><th>CS 3 - Poor</th><th>CS 4 - Severe</th></tr>
<tr><td>Delamination / Spall / Patched Area
1080</td><td>None.</td><td>Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.</td><td>Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.</td><td rowspan="8">The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.</td></tr>
<tr><td>Exposed Rebar
1090</td><td>None.</td><td>Present without measurable section loss.</td><td>Present with measurable section loss, but does not warrant structural review.</td></tr>
<tr><td>Efflorescence / Rust Staining
1120</td><td>None.</td><td>Surface white without build-up or leaching without rust staining.</td><td>Heavy build-up with rust staining.</td></tr>
<tr><td>Cracking
1130</td><td>Width less than 0.012 in. or width 0.012–0.05 in. that have been sealed.</td><td>Width 0.012–0.05 in. or moderate pattern (map) cracking.</td><td>Width greater than 0.05 in. or heavy pattern (map) cracking.</td></tr>
<tr><td>Abrasion / Wear
1190</td><td>No abrasion or wearing.</td><td>Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.</td><td>Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.</td></tr>
<tr><td>Distortion
1900</td><td>None.</td><td>Distortion not requiring mitigation or mitigated distortion.</td><td>Distortion that requires mitigation that has not been addressed but does not warrant structural review.</td></tr>
<tr><td>Settlement
4000</td><td>None.</td><td>Exists within tolerable limits or arrested with no observed structural distress.</td><td>Exceeds tolerable limits but does not warrant structural review.</td></tr>
<tr><td>Scour
6000</td><td>None.</td><td>Exists within tolerable limits or has been arrested with effective countermeasures.</td><td>Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.</td></tr>
<tr><td>Damage
7000</td><td>Not applicable.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.</td></tr>
</table>

Figure 15: Condition States- Reinforced Concrete

Prestressed Concrete Elements

Element Number	Element Name
13	Prestressed Concrete Deck
15	Prestressed Concrete Top Flange
104	Prestressed Concrete Closed Web/Box Girder
109	Prestressed Concrete Open Girder / Beam
115	Prestressed Concrete Stringer
143	Prestressed Concrete Arch
154	Prestressed Concrete Floor Beam
204	Prestressed Concrete Column
226	Prestressed Concrete Pile
233	Prestressed Concrete Pier Cap
245	Prestressed Concrete Culvert
320	Prestressed Concrete Approach Slab

Prestressed Concrete - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Delamination / Spall / Patched Area 1080	None	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Exposed Rebar 1090	None	Present without measurable section loss.	Present with measurable section loss, but does not warrant structural review.	
Exposed Prestressing 1100	None	Present without section loss	Present with section loss, but does not warrant structural review.	
Cracking 1110	Width less than 0.004 in. or width 0.004–0.009 in. that have been sealed.	Width 0.004–0.009 in. or moderate pattern (map) cracking.	Width greater than 0.009 in. or heavy pattern (map) cracking.	
Efflorescence / Rust Staining 1120	None	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Abrasion / Wear 1190	No abrasion or wearing	Abrasion or wearing has exposed coarse aggregate but the aggregate remains secure in the concrete.	Coarse aggregate is loose or has popped out of the concrete matrix due to abrasion or wear.	
Distortion 1900	None	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement 4000	None	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour 6000	None	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage 7000	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 16: Condition States - Prestressed Concrete

Steel

Element Number	Element Name
28	Steel Deck with Open Grid
29	Steel Deck with Concrete Filled Grid
30	Steel Deck Corrugated / Orthotropic / etc.
102	Steel Closed Web / Box Girder
107	Steel Open Girder / Beam
113	Steel Stringer
120	Steel Truss
141	Steel Arch
147	Steel Main Cable
148	Secondary Steel Cables
152	Steel Floor Beam
161	Steel Pin and Pin & Hanger Assembly or Both
162	Steel Gussett Plate
202	Steel Column
207	Steel Tower
219	Steel Abutment
225	Steel Pile
231	Steel Pile Cap
240	Steel Culvert
330	Metal Bridge Railing

<table>
<tr><th colspan="5">Steel - Condition State Definitions</th></tr>
<tr><th>Defect</th><th>CS 1 - Good</th><th>CS 2 - Fair</th><th>CS 3 - Poor</th><th>CS 4 - Severe</th></tr>
<tr><td>Corrosion
1000</td><td>None.</td><td>Freckled Rust. Corrosion of the steel has initiated.</td><td>Section loss is evident or pack rust is present but does not warrant structural review.</td><td rowspan="6">The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.</td></tr>
<tr><td>Cracking
1010</td><td>None.</td><td>Crack that has self arrested or has been arrested with effective arrest holes, doubling plates, or similar.</td><td>Identified crack exists that is not arrested but does not warrant structural review</td></tr>
<tr><td>Connection
1020</td><td>Connection is in place and functioning as intended.</td><td>Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.</td><td>Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.</td></tr>
<tr><td>Distortion
1900</td><td>None.</td><td>Distortion not requiring mitigation or mitigated distortion.</td><td>Distortion that requires mitigation that has not been addressed but does not warrant structural review.</td></tr>
<tr><td>Settlement
4000</td><td>None.</td><td>Exists within tolerable limits or arrested with no observed structural distress.</td><td>Exceeds tolerable limits but does not warrant structural review.</td></tr>
<tr><td>Scour
6000</td><td>None.</td><td>Exists within tolerable limits or has been arrested with effective countermeasures.</td><td>Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.</td></tr>
<tr><td>Damage
7000</td><td>Not applicable.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.</td></tr>
</table>

Figure 17: Condition States - Steel

Timber

Element Number	Element Name
31	Timber Deck
54	Timber Slabs
111	Timber Open Girder
117	Timber Stringer
135	Timber Truss
146	Timber Arch
156	Timber Floor Beam
206	Timber Column
208	Timber Trestle
212	Timber Pier Wall
216	Timber Abutment
228	Timber Pile
235	Timber Pier Cap
242	Timber Culvert
332	Timber Bridge Railing

<table>
<tr><th colspan="5">Timber - Condition State Definitions</th></tr>
<tr><th>Defect</th><th>CS 1 - Good</th><th>CS 2 - Fair</th><th>CS 3 - Poor</th><th>CS 4 - Severe</th></tr>
<tr><td>Connection
1020</td><td>Connection is in place and functioning as intended.</td><td>Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.</td><td>Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.</td><td rowspan="9">The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.</td></tr>
<tr><td>Decay / Section Loss
1140</td><td>None.</td><td>Affects less than 10% of the member section.</td><td>Affects 10% or more of the member but does not warrant structural review.</td></tr>
<tr><td>Check / Shake
1150</td><td>Surface penetration less than 5% of the member thickness regardless of location.</td><td>Penetrates 5% - 50% of the thickness of the member and not in a tension zone.</td><td>Penetrates more than 50% of the thickness of the member or more than 5% of the member thickness in a tension zone. Does not warrant structural review.</td></tr>
<tr><td>Crack
1160</td><td>None.</td><td>Crack that has been arrested through effective measures.</td><td>Identified crack exists that is not arrested, but does not require structural review.</td></tr>
<tr><td>Split / Delamination
1170</td><td>None.</td><td>Length less than the member depth or arrested with effective actions taken to mitigate.</td><td>Length equal to or greater than the member depth, but does not require structural review.</td></tr>
<tr><td>Abrasion / Wear
1180</td><td>None or no measurable section loss.</td><td>Section loss less than 10% of the member thickness</td><td>Section loss 10% or more of the member thickness but does not warrant structural review.</td></tr>
<tr><td>Distortion
1900</td><td>None.</td><td>Distortion not requiring mitigation or mitigated distortion.</td><td>Distortion that requires mitigation that has not been addressed but does not warrant structural review.</td></tr>
<tr><td>Settlement
4000</td><td>None.</td><td>Exists within tolerable limits or arrested with no observed structural distress.</td><td>Exceeds tolerable limits but does not warrant structural review.</td></tr>
<tr><td>Scour
6000</td><td>None.</td><td>Exists within tolerable limits or has been arrested with effective countermeasures.</td><td>Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.</td></tr>
<tr><td>Damage
7000</td><td>Not applicable.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.</td></tr>
</table>

Figure 18: Condition States - Timber

Masonry

Element Number	Element Name
145	Masonry Arch
213	Masonry Pier Wall
217	Masonry Abutment
244	Masonry Culvert
334	Masonry Bridge Railing

Masonry - Condition State Definitions

Defect	CS 1 – Good	CS 2 – Fair	CS 3 – Poor	CS 4 – Severe
Delamination / Spall / Patched Area 1080	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Efflorescence / Rust Staining 1120	None.	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Mortar Breakdown 1610	None.	Cracking or voids in less than 10% of joints.	Cracking or voids in 10% or more of the of joints.	
Split / Spall 1620	None.	Block or stone has split or spalled with no shifting.	Block or stone has split or spalled with shifting but does not warrant a structural review.	
Patched Area 1630	None.	Sound patch.	Unsound patch.	
Masonry Displacement 1640	None.	Block or stone has shifted slightly out of alignment.	Block or stone has shifted significantly out of alignment or is missing but does not warrant structural review.	
Distortion 1900	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement 4000	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour 6000	None	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage 7000	Not applicable	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 19: Condition States - Masonry

Other

Element Number	Element Name
60	Other Decks
65	Other Slabs
106	Other Closed Web / Box Girder
112	Other Open Girder / Beam
118	Other Stringer
136	Other Truss
142	Other Arch
149	Other Secondary Cables
157	Other Floor Beam
203	Other Column
211	Other Pier Wall
218	Other Abutments
229	Other Pile
236	Other Pier Cap
243	Other Culvert
333	Other Bridge Railing

Other Materials - Condition State Definitions

Defect	CS 1 - Good	CS 2 - Fair	CS 3 - Poor	CS 4 - Severe
Corrosion 1000	None.	Freckled Rust. Corrosion of the steel has initiated.	Section loss is evident or pack rust is present but does not warrant structural review.	The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.
Cracking 1010	None.	Crack that has self arrested or has been arrested with effective arrest holes, doubling plates, or similar.	Identified crack exists that is not arrested but does not warrant structural review.	
Connection 1020	Connection is in place and functioning as intended.	Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.	Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.	
Delamination / Spall / Patched Area 1080	None.	Delaminated. Spall 1 in. or less deep or 6 in. or less in diameter. Patched area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Patched area that is unsound or showing distress. Does not warrant structural review.	
Efflorescence / Rust Staining 1120	None	Surface white without build-up or leaching without rust staining.	Heavy build-up with rust staining.	
Cracking 1130	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width greater than 0.05 in. or spacing of less than 1 ft.	
Deterioration 1220	None.	Initiated breakdown or deterioration.	Significant deterioration or breakdown, but does not warrant structural review.	
Distortion 1900	None.	Distortion not requiring mitigation or mitigated distortion.	Distortion that requires mitigation that has not been addressed but does not warrant structural review.	
Settlement 4000	None.	Exists within tolerable limits or arrested with no observed structural distress.	Exceeds tolerable limits but does not warrant structural review.	
Scour 6000	None.	Exists within tolerable limits or has been arrested with effective countermeasures.	Exceeds tolerable limits, but is less than the critical limits determined by scour evaluation and does not warrant structural review.	
Damage 7000	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 20: Condition States- Other

Joints

Element Number	Element Name
300	Strip Seal Expansion Joint
301	Pourable Joint Seal
302	Compression Joint Seal
303	Assembly Joint with Seal
304	Open Expansion Joint
305	Assembly Joint without Seal
306	Other Joint

Joints - Condition State Definitions				
Defect	**CS 1 - Good**	**CS 2 - Fair**	**CS 3 - Poor**	**CS 4 - Severe**
Leakage 2310	None.	Minimal. Minor dripping through the joint.	Moderate. More than a drip and less than free flow of water.	Free flow of water through the joint.
Seal Adhesion 2320	Fully Adhered.	Adhered for more than 50% of the joint height.	Adhered 50% or less of joint height but still some adhesion.	Complete loss of adhesion.
Seal Cracking 2340	None.	Surface crack.	Crack that partially penetrates the seal.	Crack that fully penetrates the seal.
Seal Damage 2330	None.	Seal abrasion without punctures.	Punctured or ripped or partially pulled out.	Punctured completely through, pulled out, or missing.
Debris Impaction 2350	No debris to a shallow cover of loose debris may be evident but does not affect the performance of the joint.	Partially filled with hard-packed material, but still allowing free movement.	Completely filled and impacts joint movement.	Completely filled and prevents joint movement.
Adjacent Deck or Header 2360	Sound. No spall, delamination or unsound patch.	Edge delamination or spall 1 in. or less deep or 6 in. or less in diameter. No exposed rebar. Patched Area that is sound.	Spall greater than 1 in. deep or greater than 6 in. diameter. Exposed rebar. Delamination or unsound patched Area that makes the joint loose.	Spall, delamination, unsound patched Area or loose joint anchor that prevents the joint from functioning as intended.
Metal Deterioration or Damage 2370	None.	Freckled rust, metal has no cracks, or impact damage. Connection may be loose but functioning as intended.	Section loss, missing or broken fasteners, cracking of the metal or impact damage but joint still functioning.	Metal cracking, section loss, damage or connection failure that prevents the joint from functioning as intended.
Damage 7000	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 21: Condition States - Joints

Bearings

Element Number	Element Name
310	Elastomeric Bearing
311	Moveable Bearing
312	Enclosed / Concealed Bearing
313	Fixed Bearing
314	Pot Bearing
315	Disc Bearing
316	Other Bearing

<table>
<tr><th colspan="5">Bearings - Condition State Definitions</th></tr>
<tr><th>Defect</th><th>CS 1 - Good</th><th>CS 2 - Fair</th><th>CS 3 - Poor</th><th>CS 4 - Severe</th></tr>
<tr><td>Corrosion
1000</td><td>None.</td><td>Freckled Rust. Corrosion of the steel has initiated.</td><td>Section loss is evident or pack rust is present but does not warrant structural review.</td><td rowspan="6">The condition warrants a structural review to determine the effect on strength or serviceability of the element or bridge; OR a structural review has been completed and the defects impact strength or serviceability of the element or bridge.</td></tr>
<tr><td>Connection
1020</td><td>Connection is in place and functioning as intended.</td><td>Loose fasteners or pack rust without distortion is present but the connection is in place and functioning as intended.</td><td>Missing bolts, rivets, broken welds, fasteners or pack rust with distortion but does not warrant a structural review.</td></tr>
<tr><td>Movement
2210</td><td>Free to move.</td><td>Minor restriction.</td><td>Restricted but not warranting structural review.</td></tr>
<tr><td>Alignment
2220</td><td>Lateral and vertical alignment is as expected for the temperature conditions.</td><td>Tolerable lateral or vertical alignment that is inconsistent with the temperature conditions.</td><td>Approaching the limits of lateral or vertical alignment for the bearing but does not warrant a structural review.</td></tr>
<tr><td>Bulging, Splitting or Tearing
2230</td><td>None.</td><td>Bulging less than 15% of the thickness.</td><td>Bulging 15% or more of the thickness. Splitting or tearing. Bearing's surfaces are not parallel. Does not warrant structural review.</td></tr>
<tr><td>Loss of Bearing Area
2240</td><td>None.</td><td>Less than 10%.</td><td>10% or more but does not warrant structural review.</td></tr>
<tr><td>Damage
7000</td><td>Not applicable.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.</td><td>The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.</td></tr>
</table>

Figure 22:Condition States - Bearings

Wearing Surface

Element Number	Element Name
510	Wearing Surface

Wearing Surface - Condition State Definitions				
Defect	**CS 1 – Good**	**CS 2 - Fair**	**CS 3 - Poor**	**CS 4 - Severe**
Delamination / Spall / Patched Area / Pothole 3210	None.	Delaminated. Spall less than 1 in. deep or less than 6 in. diameter. Patched area that is sound. Partial depth pothole.	Spall 1 in. deep or greater or 6 in. diameter or greater. Patched area that is unsound or showing distress. Full depth pothole.	The wearing surface is no longer effective.
Crack 3220	Width less than 0.012 in. or spacing greater than 3.0 ft.	Width 0.012–0.05 in. or spacing of 1.0–3.0 ft.	Width of more than 0.05 in. or spacing of less than 1.0 ft.	
Effectiveness 3230	Fully effective. No evidence of leakage or further deterioration of the protected element.	Substantially effective. Deterioration of the protected element has slowed.	Limited effectiveness. Deterioration of the protected element has progressed.	
Damage 7000	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 23: Condition States - Wearing Surface

Steel Protective Coating

Element Number	Element Name
515	Steel Protective Coating

Steel Protective Coating - Condition State Definitions				
Defect	**CS 1 - Good**	**CS 2 - Fair**	**CS 3 - Poor**	**CS 4 - Severe**
Chalking 3410	None.	Surface Dulling.	Loss of Pigment.	Not Applicable.
Peeling / Bubbling / Cracking 3420	None.	Finish coats only.	Finish and primer coats.	Exposure of bare metal.
Oxide Film Degradation Color / Texture Adherence (weathering steel patina) 3430	Yellow-orange or light brown for early development. Chocolate-brown to purple-brown for fully developed. Tightly adhered, capable of withstanding hammering or vigorous wire brushing.	Granular texture.	Small flakes, less than 1/2 in. diameter.	Dark black color. Large flakes, 1/2 in. diameter or greater or laminar sheets or nodules.
Effectiveness 3440	Fully effective.	Substantially effective.	Limited effectiveness.	Failed, no protection of the underlying metal
Damage 7000	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 24: Condition States - Steel Protective Coating

Concrete Reinforcing Steel Protective Systems

Element Number	Element Name
520	Concrete Reinforcing Steel Protective System

Concrete Reinforcing Steel Protective Systems				
Defect	**CS 1 - Good**	**CS 2 - Fair**	**CS 3 - Poor**	**CS 4 - Severe**
Effectiveness 3600	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage 7000	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 25: Condition States - Concrete Reinforcing Steel Protective System

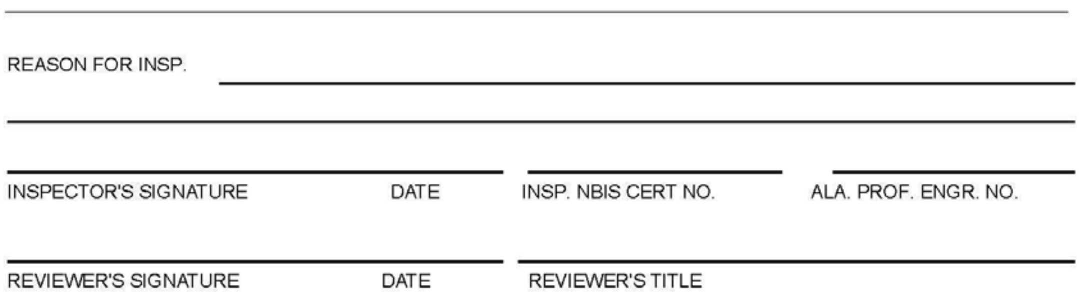
Concrete Protective Coating

Element Number	Element Name
521	Concrete Protective Coating

Concrete Protective Coating - Condition State Definitions				
Defect	**CS 1 - Good**	**CS 2 - Fair**	**CS 3 - Poor**	**CS 4 - Severe**
Wear 3510	None.	Underlying concrete not exposed, coating showing wear from UV exposure, friction course missing.	Underlying concrete is not exposed, thickness of the coating is reduced.	Underlying concrete exposed, treated cracks are exposed.
Chalking 3520	None.	Surface Dulling.	Loss of Pigment.	Not Applicable.
Peeling / Bubbling / Cracking 3530	None.	Finish coats only.	Finish and primer coats.	Exposure of bare concrete.
Effectiveness 3540	Fully effective.	Substantially effective.	Limited effectiveness.	The protective system has failed or is no longer effective.
Damage 7000	Not applicable.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 2 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 3 under the appropriate material defect entry.	The element has impact damage. The specific damage caused by the impact has been captured in condition state 4 under the appropriate material defect entry.

Figure 26: Condition States - Concrete Protective Coating

INSPECTOR INFORMATION



REASON FOR INSP.

INSPECTOR'S SIGNATURE DATE INSP. NBIS CERT NO. ALA. PROF. ENGR. NO.

REVIEWER'S SIGNATURE DATE REVIEWER'S TITLE

Figure 27: BI-5 Form – Inspector Information

REASON FOR INSPECTION

The inspector provides the reason for the inspection in the space provided. The reason is either ROUTINE or INTERIM. If the inspection is an interim inspection, then the reason for the interim inspection must also be given. An interim inspection may be performed due to posting, scour, condition ratings, or other causes.

INSPECTORS SIGNATURE AND DATE

The inspector who performed the field inspection must sign and date the form, when the inspection was done, in the space provided.

INSP. NBIS CERTIFICATION NO. / ALA. PROF. ENG. NO.

The inspector must be NBIS certified even if already a registered professional engineer in Alabama. Use the spaces provided to write in the NBIS certification number and their Alabama Professional Engineers Number if this applies.

REVIEWER'S SIGNATURE, TITLE, AND DATE

Using the spaces provided, the person who reviewed the inspection results should sign, date, and give their title.

CHAPTER 5: NEW INSPECTION TASK

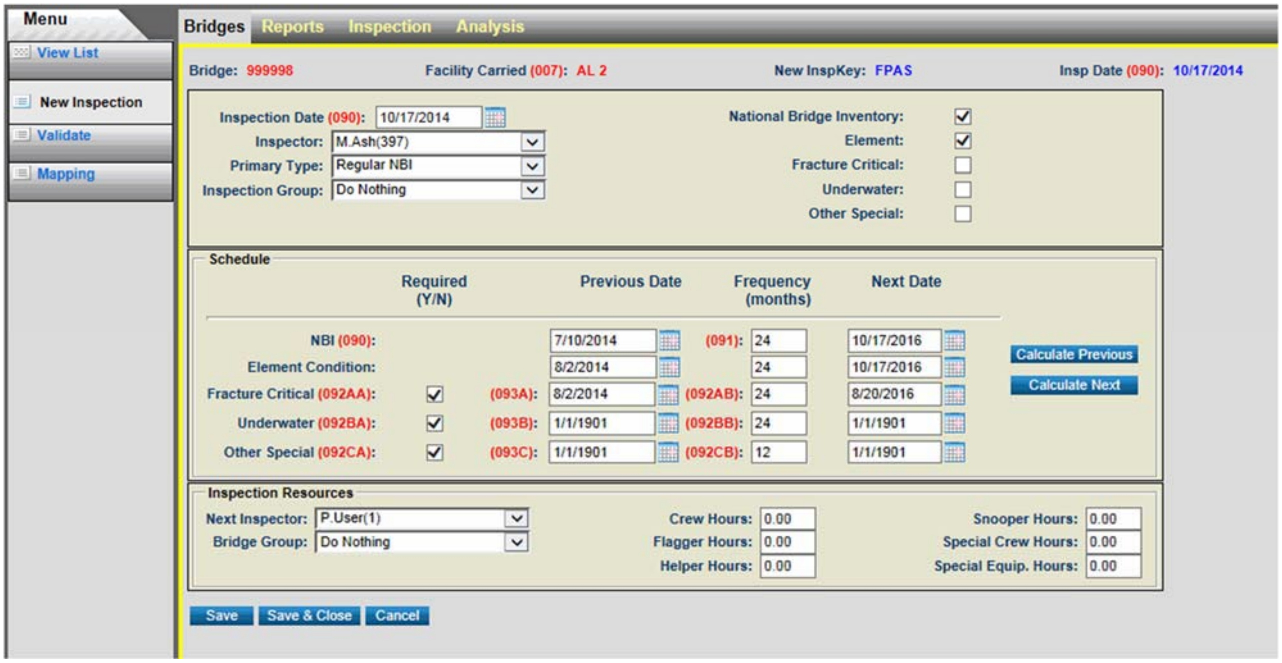


Figure 28: New Inspection Task

Before entering any new inspection data, a new inspection must be created. The ALDOT BrM User Manual gives step by step instructions on how to enter new inspections into ALDOT BrM.

ITEM 90—INSPECTION DATE

This item is updated when creating a new inspection. The inspection date may be different from the inspection dates recorded for Fracture Critical, Underwater, or Other Special Inspections. When entering the inspection date use the calendar icon to select the appropriate date. **Be sure the Inspection Date Field matches the date the inspection was actually performed**.

Due to the possibility of confusing the dates of upcoming routine and interim inspections, inspectors are urged to keep careful and specific documentation of each inspection in the bridge folder. To promote uniformity, this is accomplished by using Form BI-5 and writing *ROUTINE* or *INTERIM* in the Reason for Inspection field.

INSPECTOR

This item identifies the certified bridge inspector who performed the inspection.

PRIMARY TYPE

This item identifies the primary type of inspection that was performed.

TYPES OF INSPECTION PERFORMED

The check boxes below indicate the type of inspection(s) that was performed during the last inspection.

National Bridge Inventory

If the current inspection was a Routine Inspection then this box should be checked, but if the current inspection was not a Routine Inspection then this box should not be checked.

Fracture Critical

If the current inspection was a Fracture Critical Inspection then this box should be checked, but if the current inspection was not a Fracture Critical Inspection then this box should not be checked.

Underwater

If the current inspection was an Underwater Inspection then this box should be checked, but if the current inspection was not an Underwater Inspection then this box should not be checked.

Other Special

If the current inspection was an Interim Inspection then this box should be checked, but if the current inspection was not an Interim Inspection then this box should not be checked.

ITEM 92AA—FRACTURE CRITICAL REQUIRED

This is a check box indicating whether or not this structure requires a Fracture Critical Inspection. If the structure requires a Fracture Critical Inspection, then this box should be checked, but if the structure does not require a Fracture Critical Inspection, then this box should not be checked. For more information on Fracture Critical Bridges please see the Fracture Critical Members and Fracture Critical Bridges section of this manual.

ITEM 92BA—UNDERWATER REQUIRED

This is a check box indicating whether or not this structure requires an Underwater Inspection. If the structure requires an Underwater Inspection, then this box should be checked, but if the structure does not require an Underwater Inspection, then this box should not be checked. For more information on Underwater Inspections please see the Underwater Inspection of Bridges section of this manual.

ITEM 92CA—OTHER SPECIAL REQUIRED

This is a check box indicating whether or not this structure requires a Special (Interim) Inspection. If the structure requires a Special (Interim) Inspection, then this box should be checked, but if the structure does not require a Special (Interim) Inspection, then this box should not be checked. For more information on Special (Interim) Inspections please see ALDOT"S Guidelines for Operations in Appendix G.

NBI PREVIOUS DATE

This item identifies the date of the previous NBI Inspection. This field is updated when a new inspection is created.

ELEMENT CONDITION PREVIOUS DATE

This item identifies the date of the previous Element Inspection. This field is updated when a new inspection is created.

ITEM 93A—FRACTURE CRITICAL PREVIOUS DATE

This item identifies the date of the previous Fracture Critical Inspection. This field is updated when a new inspection is created. If the structure is not fracture critical, then this field will contain 01/01/1901.

ITEM 93B—UNDERWATER PREVIOUS DATE

This item identifies the date of the previous Underwater Inspection. This field is updated when a new inspection is created. If the structure does not require an Underwater Inspection, then this field will contain 01/01/1901.

ITEM 93C—OTHER SPECIAL PREVIOUS DATE

This item identifies the date of the previous Special (Interim) Inspection. This field is updated when a new inspection is created. If the structure does not require a Special (Interim) Inspection, then this field will contain 01/01/1901.

ITEM 91— NBI FREQUENCY

This item identifies the number of months between designated routine inspections for the structure. The majority of structures in Alabama will have a 24 month frequency. The inspection frequency will not exceed a 24 month interval between routine inspections, but it may be less than 24 months if deemed necessary.

ELEMENT CONDITION FREQUENCY

This item identifies the number of months between designated Element Inspections for the structure. The majority of structures in Alabama will have a 24 month frequency. The inspection frequency will not exceed a 24 month interval between Element Inspections, but it may be less than 24 months if deemed necessary.

ITEM 92AB—FRACTURE CRITICAL FREQUENCY

This item identifies the frequency for the Fracture Critical Inspection. The maximum allowable inspection frequency for a Fracture Critical Detail in Alabama is 24 months. This inspection frequency will not exceed a 24 month interval between Fracture Critical Inspections, but it may be less than 24 months if deemed necessary. If the structure is not fracture critical, then this field should be left blank.

ITEM 92BB—UNDERWATER FREQUENCY

This item identifies the frequency for the Underwater Inspection. The maximum allowable inspection frequency for an Underwater Inspection for a state owned structure in Alabama is 24 months unless approved by the Maintenance Bureau of ALDOT. The maximum allowable inspection frequency for an Underwater Inspection for a county or city owned structure in Alabama is 48 months. This inspection frequency will not exceed the intervals listed above, but may be less if deemed necessary. If the structure does not require an Underwater Inspection, then this field should be left blank.

ITEM 92CB—OTHER SPECIAL FREQUENCY

This item identifies the frequency for the Special (Interim) Inspection. Using ALDOT's Guidelines for Operations, an Interim Inspection is defined as an inspection at least every 12 months; or more often if deemed necessary by the owner's bridge inspector, the Emergency Bridge Inspection team, or the appropriate Guideline for Operation. For all posted bridges (where Item 41 is coded as "B" or "P") Item 91 is coded as 12 months or less. The designated inspection interval can also vary from inspection to inspection depending on the condition of the bridge at the time of the inspection. Please see Appendix G of this manual for more details on how to determine the appropriate Interim Inspection Frequency. If the structure does not require a Special (Interim) Inspection, then this field should be left blank.

NBI NEXT DATE

This item identifies the date of the next NBI Inspection. This field is updated when a new inspection is created.

ELEMENT CONDITION NEXT DATE

This item identifies the date of the next Element Inspection. This field is updated when a new inspection is created.

FRACTURE CRITICAL NEXT DATE

This item identifies the date of the next Fracture Critical Inspection. This field is updated when a new inspection is created. If the structure is not fracture critical, then this field will contain 01/01/1901.

UNDERWATER NEXT DATE

This item identifies the date of the next Underwater Inspection. This field is updated when a new inspection is created. If the structure does not require an Underwater Inspection, then this field will contain 01/01/1901.

OTHER SPECIAL NEXT DATE

This item identifies the date of the next Special (Interim) Inspection. This field is updated when a new inspection is created. If the structure does not require a Special (Interim) Inspection, then this field will contain 01/01/1901.

CREW HOURS

This item identifies the number of crew hours used during the last inspection.

FLAGGER HOURS

This item identifies the number of flagger hours used during the last inspection. If no flaggers were used during the last inspection then this field should be coded “0.00”.

HELPER HOURS

This item identifies the number of helper hours used during the last inspection. If no helpers were used during the last inspection then this field should be coded “0.00”.

SNOOPER HOURS

This item identifies the number of snooper hours used during the last inspection. If no snoopers were used during the last inspection then this field should be coded “0.00”.

SPECIAL CREW HOURS

This item identifies the number of special crew hours used during the last inspection. If no special crew hours were used during the last inspection then this field should be coded “0.00”.

SPECIAL EQUP. HOURS

This item identifies the number of special equipment hours used during the last inspection. If no special equipment hours were used during the last inspection then this field should be coded “0.00”.

CHAPTER 6: BI-6 – STRUCTURAL INVENTORY AND APPRAISAL

INTRODUCTION

This section describes the coding of the items on the BI-6 form. The BI-6 form is the longest of the bridge inspection forms and contains the majority of the inspection items. A blank BI-6 form is included in Appendix D of this manual.

At the top of each page of the form, the Bridge Identification Number (BIN) and the Structure Number are printed. Also printed at the top of each page is the sheet (page) number, the date printed, and space for the inspector to enter the date that the inspection was made. This 9-page form contains information from nine screens in ALDOT BrM.

Screen	Page
Appraisal Task	1
Inventory – Admin Subtask	2
Inventory – Design Subtask	3
Inventory – Roads Subtask	4
Inventory – Identification Subtask	6
Inventory – State Items Subtask	8
Schedule Task	9*
Condition Task	9*
Replacement Program	9*

* Page 9 is for reference only. The information on this page is entered with the BI-5 form or calculated by the database.

This section of the manual is divided into subsections which correspond to the various sections (screens) of the BI-6 form. An illustration of the BI-6 form covered in a particular portion of this section is shown on the first page of each subsection. Further information on how to enter the data into the computer is given in the ALDOT BrM User Manual

Appraisal Task

	Structure Inventory and Appraisal	Date: ______________
FORM: BI-6	STR. NUM.: OAL0008 240075.014-1	Sheet: 1
BIN: 018022 1 REC		Printed: 10/17/2014

Appraisal Task

STRUCTURAL APPRAISAL

	CURRENT	NEW
41) OPEN/POSTED/CLOSED	A Open, no restriction	xxxxxx
72) APPROACH ALIGNMENT	7 Above Min Criteria	______________
36A) BRIDGE RAILINGS	1 Meets Standards	______________
36B) TRANSITIONS	1 Meets Standards	______________
36C) APPROACH GUARDRAIL	1 Meets Standards	______________
36D) APPROACH GUARDRAIL ENDS	0 Substandard	______________
111) PIER PROTECTION	1 Not Required	______________
113) SCOUR CRITICAL	8 Stable Above Footing	______________
FRACTURE CRITICAL DETAILS	No FC Details	______________

CALCULATED APPRAISAL RATINGS

	CURRENT	NEW
67) STRUCTRAL EVALUATION	7 Above Min Criteria	xxxxx
68) DECK GEOMETRY	7 Above Min Criteria	xxxxx
69) UNDERCLEARANCES	N Not applicable (NBI)	xxxxx
SD/FO STATUS	Not Deficient	xxxxx
SUFFICIENCY RATING	97.80	xxxx.x
SUFFICIENCY RATING CALCULATE STATUS	0	xxxxx
HEALTH INDEX	99.62	xxxxx%

CLEARANCES

	CURRENT	NEW
MINIMUM VERTICAL CLEARANCES		
53) OVER STRUCTURE	99.99 ft	______________ft
54A) UNDER (REFERENCE)	N Feature not hwy or RR	______________
54B) UNDER CLEARANCE	0.00 ft	______________ft
MINIMUM LATERAL CLEARANCES		
55A) REFERENCE FEATURE	N Feature not hwy or RR	______________
55B) RIGHT SIDE	0.00 ft	______________ft
56) LEFT SIDE	0.00 ft	______________ft
NAVIGATION DATA		
38) NAVIGATION CONTROL EXISTS	NA-no waterway	______________
39) NAVIGATION VERTICAL CLEARANCES	0.00 ft	______________ft
40) NAVIGATION HORICONTAL CLEARANCES	0.00 ft	______________ft
116) MINIMUM VERTICAL LIFT CLEARANCES	0.00 ft	______________ft

NBI LOAD RATINGS

	CURRENT	NEW
LOAD RATING REVIEW RECOMMENDED	No	______________
RATING DATE	11/01/2007	xxxxx
31) DESIGN LOAD	5 MS 18 (HS 20)	xxxxxxx
70) POSTING	5 At/Above Legal Loads	______________
63) OPERATING TYPE	1 LF Load Factor	______________
64) OPERATING RATING	83.17	______________ton
65) INVENTORY TYPE	1 LF Load Factor	______________
66) INVENTORY RATING	49.80	______________ton

Figure 29: Appraisal Task

ITEM 41—OPEN / POSTED / CLOSED

This item provides information about the operational status of a structure. The field contains the parameters below:

Code	Description
A	Open, no restriction
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	Bridge closed to all traffic.
P	Posted for load (may include other restrictions such as temporary bridges which are load posted).
R	Posted for other load-capacity restrictions (speed, number of vehicles on bridge, etc.)

The field review could show that a structure is posted, but Item 70 - Bridge Posting may indicate that posting is not required. The apparent contradiction can be resolved and understood if one considers the fact that Item 70 is based on the operating stress level, but Item 41 reflects the governing agency's posting procedures which may specify posting at some stress level less than the operating rating.

ITEM 72—APPROACH ROADWAY ALIGNMENT

This field identifies those bridges which do not function properly or adequately due to the alignment of the approaches. Code this item based on the adequacy of the approach roadway alignment. It is not intended that the approach roadway alignment be compared to current standards, but rather to the existing alignment of the section of highway the bridge is on. This concept differs from the other appraisal evaluations. Speed reduction due to structure width alone is not considered in evaluating this item.

The individual structure is rated in accordance with the following parameters:

Code	Description
9	Excellent alignment - alignment of approach roadway is superior to the section of road which the bridge is on.
8	Very good alignment - horizontal and vertical curvature are such that no reduction in vehicle operating speed is required from that on the highway section.
7	Good alignment - little or no speed reduction required; both horizontal and vertical curvatures are good in relation to those on the highway section.

6	Satisfactory alignment - very minor speed reduction is required because of horizontal or vertical curvature of the approach roadway.
5	Fair alignment - moderate speed reduction is required.
4	Poor alignment - moderate to substantial speed reduction is required.
3	Serious misalignment - approach roadway alignment is intolerable; substantial speed reduction is required.
2	Critical misalignment - misalignment is such that vehicles must nearly stop to safely cross the bridge.
0	Bridge closed.

ITEM 36A – BRIDGE RAILINGS

Factors that affect the proper functioning of bridge railing include height, material, strength, and geometric features. One of the design features of railings is that they are capable of smoothly redirecting an impacting vehicle away from the traffic in the opposing lanes or other hazardous zones. Check to ensure that this and other design features are functioning properly. The *AASHTO Standard Specifications for Highway Bridges*, calls for railings to meet specific geometric criteria, to be crash tested per FHWA policy, and to resist specified static loads without exceeding the allowable stresses in their elements. Railings that meet these criteria and loading conditions are considered acceptable. Other railings that have been successfully crash tested are considered acceptable even though they may not meet the static loading analysis and geometric requirements. Acceptable guidelines for bridge railing design and testing are also found in the AASHTO *Manual for Assessing Safety Hardware.* (Note, these publications are the current editions at the time this manual was written. Future editions should be used when appropriate.) This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

ITEM 36B – TRANSITIONS

The transition from approach guardrail to bridge railing requires that the approach guardrail be firmly attached to the bridge railing. It also requires that the approach guardrail be gradually stiffened as it comes closer to the bridge railing. Check to ensure that the ends of curbs and safety walks are gradually tapered out or shielded. This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

ITEM 36C - APPROACH GUARDRAIL

Investigate and determine the structural adequacy and compatibility of approach guardrail with transition designs. Rarely does the need for a barrier stop at the end of a bridge. Thus, an approach guardrail with adequate length and structural qualities to shield motorists from the hazards at the bridge site may be appropriate. In addition to safely redirecting an impacting vehicle away from the danger zones, the approach guardrail also facilitates a smooth transition to the bridge railing that will not cause snagging or pocketing of an impacting vehicle. Acceptable guardrail design suggestions are contained in the *AASHTO Roadside Design Guide* and subsequent FHWA or AASHTO guidelines. (Note, these publications are the current editions at the time this manual was written. Future editions should be used when appropriate.) This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

ITEM 36D – APPROACH GUARDRAIL ENDS

As with guardrail ends in general, the ends of approach guardrails to bridges are flared, buried, made breakaway, or shielded. Design treatment of guardrail ends is given in the *AASHTO Roadside Design Guide.* (Note, these publications are the current editions at the time this manual was written. Future editions should be used when appropriate.) This field contains the parameters listed below:

Code	Description
0	Substandard
1	Meets Standards
N	Not Applicable or not required

ITEM 111—PIER PROTECTION

This item indicates the presence and adequacy of pier or abutment protection such as fenders or dolphins. It is coded only if the bridge is under navigational control (Item 38 has been coded "1"). The condition of the protection devices may be a factor in the overall evaluation of Item 60 - Substructure. If Item 38 - Navigation Control has been coded as N/A or Permit Not Required, code this field "N" to indicate that it is not applicable. This field contains the parameters listed below:

Code	Description
N	Item 38 is coded as N/A or Permit Not Required.
1	Navigation protection not required.
2	In place and functioning.
3	In place but in a deteriorated condition.
4	In place but reevaluation of design suggested.
5	None present but reevaluation suggested.

ITEM 113—SCOUR CRITICAL

The codes described below are used to indicate the degree to which the bridge is vulnerable to scour. To determine a bridge's current scour status, analysis of bridges are made by hydraulic/ geotechnical/ structural engineers. Details on conducting a scour analysis are included in the FHWA Technical Advisory 5140.23 entitled, "Evaluating Scour at Bridges." Whenever a rating of " 2" or below is determined for this item, the rating for Item 60—Substructure and other affected items (i.e., load ratings , superstructure ratings) should be revised to be consistent with the severity of observed scour and resultant damage to the bridge. A plan of action should be developed for each scour critical bridge. A scour critical bridge is one with abutment or pier foundations rated as unsafe due to (1) observed scour at the bridge site or (2) a scour potential as determined from a scour evaluation study. This field contains the parameters listed below:

Code	Description
N	Bridge is 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 and immediately after flood events.
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 until an evaluation is performed ("Unknown" foundations in tidal waters should be coded U.)
9	Bridge foundations (including piles) well above flood water elevations.
8	Bridge foundations determined to be stable for the assessed or calculated scour condition. Scour is determined to be above the top of the footing (Examples A) by assessment, by calculations or by installation of properly designated countermeasures.
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. (Use only to describe cases where bridges have not been evaluated for scour potential).
5	Foundations determined to be stable for assessed or calculated scour condition. Scour is determined to be within limits of footing or piles (Example B) by assessment, by calculations or by installation of properly designed counter measures.
4	Foundations determined to be stable for assessed or calculated scour conditions; field review indicates action is required to protect exposed foundations.
3	Structure is scour critical; foundations determined to be unstable for assessed or calculated scour conditions:

- Scour within limits of footing or piles. (Example B)
- Scour below spread-footing base or pile tips. (Example C)

2 Structure 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 Item 60.

1 Structure is scour critical; field review indicates that failure of piers and/or abutments is imminent; bridge is closed to traffic. Failure is imminent based on:

- 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 Item 60.

0 Structure is scour critical; bridge has failed and is closed to traffic.

FRACTURE CRITCAL DETAILS

This item identifies Fracture Critical elements on a structure (if applicable). This field contains the parameters listed below:

Parameters
Missing
One or two steel girder system
Hinges with pin and hanger assemblies
Steel bent caps – tensile structure
Steel trusses
Stl tns elm w<3 mlt i-br
Suspension or cable structures
Single and multiple cell steel box girder
High fatigue pron weld detected
High strength steel girders
Horizontally curved girders
Det. prn out-of-pin bend
Electrosig weld fabricated process
Partial in meld cover plate
Exposed prestress tendons
No Fracture Critical details
Superstructure or substructure integral fram det
Tied Arches

ITEM 67—STRUCTURAL EVALUATION

This item is calculated by the Edit/Update Program based on Table 11-1, and need not be coded by the bridge inspector. If the program is unable to determine a code due to an error or omission in the inventory data, an unknown is coded for this item. A code of "N" is not used for this item.

For culverts, the lower of the condition ratings obtained from Item 62—Culverts and Table 11-1 is used. For structures other than culverts, the lowest of the ratings obtained from Item 59, Item 60, and Table 11-1 is used. If Item 59, Item 60 or Item 62 is coded "1," then Item 67 is equal to zero, regardless of whether the structure is actually closed. However, if the structure is closed, it does not mean that this value is zero unless the overall condition and appraisal ratings indicate that a code of "0" is appropriate.

Table 1: Rating by Comparison of Item 29—Annual Average Daily Traffic and Item 66—Inventory Rating

Structural Evaluation Rating Code	Inventory Rating		
	Annual Average Daily Traffic (AADT)		
Code	0 - 500	501 - 5000	>5000 or Interstate
9	>236# (HS20)##	>236 (HS20)	>236 (HS20)
8	236 (HS20)	236 (HS20)	236 (HS20)
7	231 (HS17)	231 (HS17)	231 (HS17)
6	223 (HS13)	225 (HS14)	227 (HS15)
5	218 (HS10)	220 (HS11)	222 (HS12)
4	212 (HS7)	214 (HS8)	218 (HS10)
3	Inventory rating less than value in rating code of 4 and requiring corrective action.		
2	Inventory rating less than value in rating code of 4 and requiring replacement.		
0	Bridge closed due to structural condition.		
Unknown	Edit/Update program unable to determine rating because of errors or omissions in file.		

Coded HS rating load (typical)

HS Designation (typical)

Table 1 Notes

1. The lower rating code will be selected by the computer for values between those listed in the table.

2. Inventory ratings are shown in tons with decimal point.

3. To use Table 1, the inventory rating must be the coded HS rating or its equivalent. If the comparable HS equivalent is not calculated for the controlling rating, using a factor to determine the HS equivalent is acceptable even though converting other rating loads to an HS equivalent is not a constant.

4. All bridges with Item 26 - Functional Classification coded Interstate, Freeway or Expressway shall be evaluated using the AADT column of >5000 regardless of the actual AADT on the bridge.

ITEM 68—DECK GEOMETRY

The inspector does not code this item. It is automatically coded by the Edit/Update Program. The program will determine a code as described below.

In the appraisal of deck geometry, two separate ratings are evaluated and the lower of the two is used. The first rating is based on the curb-to-curb or face-to-face of rail bridge width using Table 2A, 2B, 2C, or 2D. The second rating is based on the minimum vertical clearance over the bridge roadway using Table 2E. When an individual table lists several deck geometry rating codes for the same roadway width under a specific AADT, the lower code is used. For example, Table 2A lists deck geometry rating codes of “6”,”7” and ” 8” for a 44 foot roadway width and an AADT of >5000 (6 will be used for this case). For values between those listed in the tables, the lower code is used.

The curb-to-curb or face-to-face of rail dimension shall be taken from Item 51 - Bridge Roadway Width, Curb-to-Curb. Item 53 – Over Structure is used to evaluate the vertical clearance.

If the structure is a culvert and the roadway is carried by fill then an "N" will be coded for this item.

The values provided in the tables are for rating purposes only. Current design standards must be used for structure design or rehabilitation.

Tables 2A, 2B, 2C, 2D, and 2E plus supporting information on how the computer applies them are given on the following pages.

Table 2A & 2B: Rating by Comparison of Item 29—AADT and Item 51—Bridge Roadway Width, Curb-to-Curb

Deck Geometry Rating Code	TABLE 2A						TABLE 2B	
	Bridge Roadway Width 2 Lanes; 2 Way Traffic						Bridge Roadway Width 1 Lane; 2-Way Traffic	
	AADT (Both Directions)						AADT (Both Directions)	
	0-100	101-400	401-1000	1001-2000	2001-5000	>5000	0-100	>100
9	>32	>36	>40	>44	>44	>44	-	-
8	32	36	40	44	44	44	15'-11"	-
7	28	32	36	40	44	44	15	-
6	24	28	30	34	40	44	14	-
5	20	24	26	28	34	38	13	
4	18	20	22	24	28	32 (28)#	12	-
3	16	18	20	22	26	30 (26)#	11	< 15' 11"
2	Any width less than required for a rating code of 3 and structure is open.							
0	Bridge closed.							
N	Not applicable. Structure is a culvert with roadway on fill.							
Unknown	Edit/Update program unable to determine rating because of errors or omissions in file.							

Value in parentheses is used by the computer for bridges longer than 200 feet.

Notes:

1. The lower rating code will be selected by the computer for values between those listed in the table.
2. Dimensions are in feet.
3. For 1-lane of one-way traffic Table 2A is used.
4. For 3 or more undivided lanes of 2-way traffic, the computer will use "Other Multilane Divided Facilities" on Table 2C.
5. When the AADT>100, Table 2B for code "9" or for codes "8" through "4" inclusive will not be used by the computer. Single lane bridges less than 16 feet wide carrying 2-way traffic are always appraised at "3" or below if they carry more than an AADT of 100.
6. One-lane bridges 16 feet and greater in roadway width, which are not ramps, are evaluated as a 2-lane bridge using Table 2A.

Table 2C & 2D: Rating by Comparison of Item 28—Number of Lanes and Item 51—Bridge Roadway Width, Curb-to-Curb

Deck Geometry Rating Code	TABLE 2C: Bridge Roadway Width 2 or more Lanes — Interstate and Other Divided Freeways: 2 Lanes 1-way	TABLE 2C: Interstate and Other Divided Freeways: 3 or more Lanes	TABLE 2C: Other Multilane Divided Freeways: 2 Lanes 1-way	TABLE 2C: Other Multilane Divided Freeways: 3 or more Lanes	TABLE 2D: Bridge Roadway Width 1-Way Traffic — Ramps Only (Item 5C = 7): 1 Lane	TABLE 2D: Ramps Only (Item 5C = 7): 2 or more Lanes
9	>42	> 12N+24	>42	>12N+18	>26	>12N+12
8	42	12N+24	42	12N+18	26	12N+12
7	40	12N+20	38	12N+15	24	12N+10
6	38	12N+16	36	12N+12	22	12N+ 8
5	36	12N+14	33	11N+10	20	12N+ 6
4	34(29)	11N+12 (11N+7)#	30	11N+6	18	12N+ 4
3	33(28)	11N+11 (11N+6)#	27	11N+5	16	12N+ 2
2	Any width less than required for a rating code of 3 and structure is open.					
0	Bridge closed.					
N	Not applicable. Structure is a culvert with roadway on fill.					
Unknown	Edit/Update program unable to determine rating because of errors or omissions in file.					

Value in parentheses will be selected by the computer for bridges longer than 200 feet.

N = number of lanes of traffic.

Notes:

1. The lower rating code will be selected by the computer for values between those listed in the tables.
2. Dimensions are in feet.
3. The computer will use "Other Multilane Divided Facilities" column of Table 2C for 3 or more undivided lanes of 2-way traffic.

Table 2E: Rating by Comparison of Item 53—Minimum Vertical Clearance over Bridge Roadway and Item 26—Functional Classification

	TABLE 2E		
Deck Geometry Rating Code	Minimum Vertical Clearance		
	Functional Classification		
	Interstate and Other Freeway	Other Principal and Minor Arterial	Major and Minor Collectors and Locals
9	> 17' - 0"	>16' - 6"	>16' - 6"
8	17' - 0"	16' - 6"	16' - 6"
7	16' - 9"	15' - 6"	15' - 6"
6	16' - 6"	14' - 6"	14' - 6"
5	15 '- 9"	14 - 3"	14' - 3"
4	15' - 0"	14' - 0"	14' - 0"
3	Vertical clearance less than value in rating code of 4 and requiring corrective action.		
2	Vertical clearance less than value in rating code of 4 and requiring replacement.		
0	Bridge closed.		
N	Not applicable. Structure is a culvert with roadway of fill.		
Unknown	Edit/Update program unable to determine rating because of errors or omissions in file.		

Notes:

1. The lower rating code for values between those listed in the table will be selected by the computer.

2. Dimensions are in feet.

ITEM 69—UNDER CLEARANCES, VERTICAL AND HORIZONTAL

This item is not coded by the inspector. The Edit/Update Program will automatically determine the code for this item using the procedure described below.

This item indicates the appraisal rating for vertical and horizontal under clearances from the through roadway to the superstructure or substructure units. A code of "N" (not applicable) is entered if the bridge is not over a highway or railroad.

The vertical under clearance is evaluated using Table 3A, and the horizontal or lateral under clearance is evaluated using Table 3B. The lower of these two codes is the rating for this item.

Bridges seldom are closed due to deficient under clearances, however, these bridges may be good candidates for rehabilitation or replacement.

Table 3A. Rating by Comparison of Item 54—Minimum Vertical Under Clearance and Functional Classification of Underpassing Route

TABLE 3A				
Under-Clearance Rating Code	Minimum Vertical Under Clearance			
	Functional Classification			Railroad
	Interstate and Other Freeway	Other Principal and Minor Arterial	Major and Minor Collectors and Locals	
9	>17’ - 0’’	>16’ - 6’’	>16’ - 6’’	>23’ - 0’’
8	17’ - 0’’	16’ - 6’’	16’ - 6’’	23 ’- 0’’
7	16’ - 9’’	15’ - 6’’	15’ - 6’’	22’ - 6’’
6	16’ - 6’’	14’ - 6’’	14’ - 6’’	22’ - 0’’
5	15’ - 9’’	14’ - 3’’	14’ - 3’’	21’ - 0’’
4	15’ - 0’’	14 - 0’’	14’ - 0’’	20’ - 0’’
3	Under clearance less than value in rating code of 4 and requiring corrective action.			
2	Under clearance less than value in rating code of 4 and requiring replacement.			
0	Bridge closed.			
N	Not applicable. Bridge not over a highway or railroad.			
Unknown	Edit/Update program unable to determine rating because of errors or omissions in file.			

Notes

1. The lower rating code will be selected by the computer for values between those listed in the tables.

2. Dimensions are in feet

3. The functional classification of the underpassing route is used in the evaluation. If an "under" record is not coded, the underpassing route is considered a major or minor collector or a local road.

Table 3B. Rating by Comparison of Items 55 & 56—Minimum Lateral Under Clearances Right & Left and Item 26 - Functional Classification of Underpassing Route

TABLE 3B							
Under-Clearance Rating Code	Minimum Lateral Under Clearance						
	Functional Classification						Railroad
	1-Way Traffic				2-Way Traffic		
	Principal Arterial - Interstate, Freeways or Expressways				Other Principal and Minor Arterial	Major and Minor Collectors and Locals	
	Main Line		Ramp				
	Left	Right	Left	Right			
9	>30	>30	>4	>10	>30	>12	>20
8	30	30	4	10	30	12	20
7	18	21	3	9	21	11	17
6	6	12	2	8	12	10	14
5	5	11	2	6	10	8	11
4	4	10	2	4	8	6	8
3	Under clearance less than value in rating code of 4 and requiring corrective action.						
2	Under clearance less than value in rating code of 4 and requiring replacement.						
0	Bridge closed.						
N	Not applicable. Bridge is not over a highway or railroad.						
Unknown	Edit/Update program unable to determine rating because of errors or omissions in the file.						

Notes:

1. The lower rating code will be selected by the computer for values between those listed in the tables.
2. Dimensions are in feet.
3. When acceleration or deceleration lanes or ramps are provided under 2-way traffic, the computer uses the value from the right ramp column to determine code.
4. The functional classification of the underpassing route is used in the evaluation. If an "under" record is not coded, the underpassing route is considered a major or minor collector or a local road.

SD/FO STATUS

The status code is automatically entered by the computer during data processing. This field contains the parameters listed below:

Parameters
Not Deficient
Structurally Deficient
Functionally Obsolete

SUFFICIENCY RATING (SRB)

The sufficiency rating is automatically calculated by the computer based upon data from the most recent inspection. The formula is a method of evaluating four separate factors to obtain a numeric score indicating the bridge's sufficiency to remain in service. The result of this method is a percentage in which 100 represents an entirely sufficient bridge and 0 represents an entirely insufficient or deficient bridge. The number is given as three digits with one decimal point.

SUFFICIENCY RATING CALCULATE STATUS

This item is automatically determined by the database. This status lets you know if the most current sufficiency rating is stored in the database. Two codes are used for this item.

Code	Description
0	The most recent bridge inspection data has been calculated for the sufficiency rating.
1	A new inspection has been created and the data needs to be recalculated to get a new sufficiency rating.

HEALTH INDEX

The Health Index is value assigned to either a bridge or a group of bridges ranging from 0 – 100. This value is used for bridge maintenance, the higher the index the better the shape the structure is in, whereas; the lower the index the worst shape the structure or structures are in.

ITEM 53 – OVER STRUCTURE

The measurement for this 5-digit item is the minimum vertical clearance over a bridge roadway, i.e., the minimum vertical distance between the bridge roadway (including shoulders) and any superstructure restriction. When no superstructure restriction exists above the bridge roadway, or when a restriction is 100 feet or greater, code "99.99". The measurement is rounded down to the nearest hundredth of a foot. For double decked structures, code the minimum regardless of whether it is pertaining to the top or bottom deck.

Minimum Vertical Clearance	Code
17.22 feet	17.22
80.21 feet	80.21
No restriction	99.99

ITEM 54A – UNDER (REFERENCE)

This is a code that identifies the reference feature beneath the bridge. A reference feature could be a railroad, a highway, a river, etc. which is located beneath the bridge. Using one of the codes below, enter the reference feature from which the under clearance measurement is taken. When both a railroad and a highway are under the structure, code the feature with the most restrictive dimension. This field contains the parameters listed below:

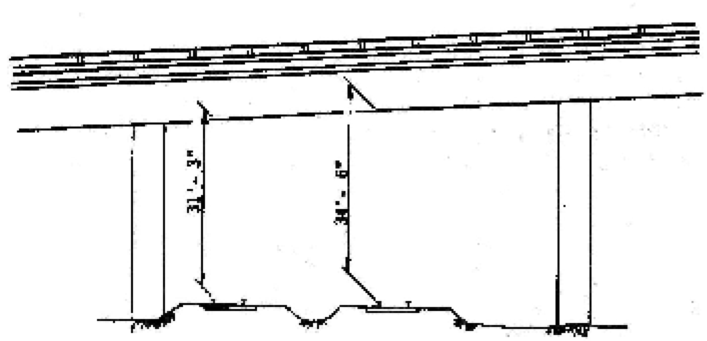
Code	Description
H	Highway beneath structure
R	Railroad beneath structure
N	Feature not a highway or railroad

ITEM 54B – UNDER CLEARANCE

This 4-digit number records the minimum vertical clearance from the roadway (travel lanes only) or railroad track beneath the structure to the underside of the superstructure. Enter the minimum vertical clearance from the highway or railroad to the underside of the structure, rounded down to the nearest hundredth of a foot. When a restriction is 100 feet or greater, code "99.99". If the feature is not a highway or railroad, code the minimum vertical under clearance as "0000".

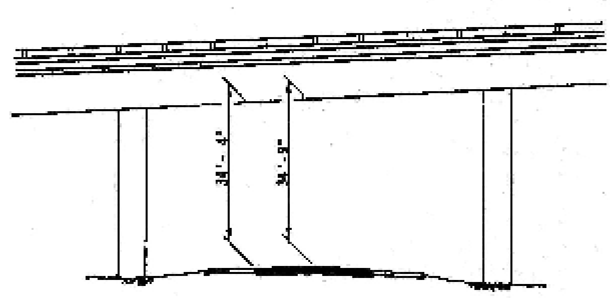
Examples:

Description	Code 54A	Code 54B
River beneath structure	N	0



Railroad 31'-3" beneath structure R3103

Railroad 31.25 ft. beneath structure R 31.25



Highway 34'-4" beneath structure H3404

Figure 30: Example Minimum Vertical Under Clearance

ITEM 55A – REFERENCE FEATURE

Using one of the codes below, enter the reference feature from which the clearance measurement is taken. When both a railroad and a highway are under the structure, code the most restrictive dimension. This field contains the parameters listed below:

Code	Description
H	Highway beneath structure
R	Railroad beneath structure
N	Feature not a highway or railroad

ITEM 55B – RIGHT SIDE

Enter a 4-digit number to represent the minimum lateral under clearance on the right. In the case of a highway, the lateral under clearance on the right is measured from the right edge of the <u>through</u> roadway (excluding shoulders) to the nearest substructure element (i.e., pier or abutment), to a rigid barrier (concrete bridge rail, etc.), or toe of slope greater than 3 to 1. If a railroad runs underneath the structure, the lateral under clearance on the right is measured from the centerline of the railroad to the nearest substructure, rigid barrier, or toe of slope greater than 3 to 1 in the direction of travel. The clearance measurement to be recorded will be the minimum after measuring the clearance in <u>both</u> directions of travel. In the event of a dual highway or railroad, the lateral clearances on the right of both roadways or railroads are measured and the smaller distance is recorded and coded. 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 "99.99". If the feature beneath the structure is not a railroad or a highway, code "0000."

The presence of ramps and acceleration or turning lanes is not considered in this item; therefore the minimum lateral clearance on the right is measured from the right edge of the through roadway.

Examples:

	Code	
Description	55A	55B
Railroad 20.4 ft. centerline to pier	R	20.40
Creek beneath structure	N	0
Highway 53.02 ft. edge of pavement to pier H	H	53.02

See additional examples shown in Figure 31.

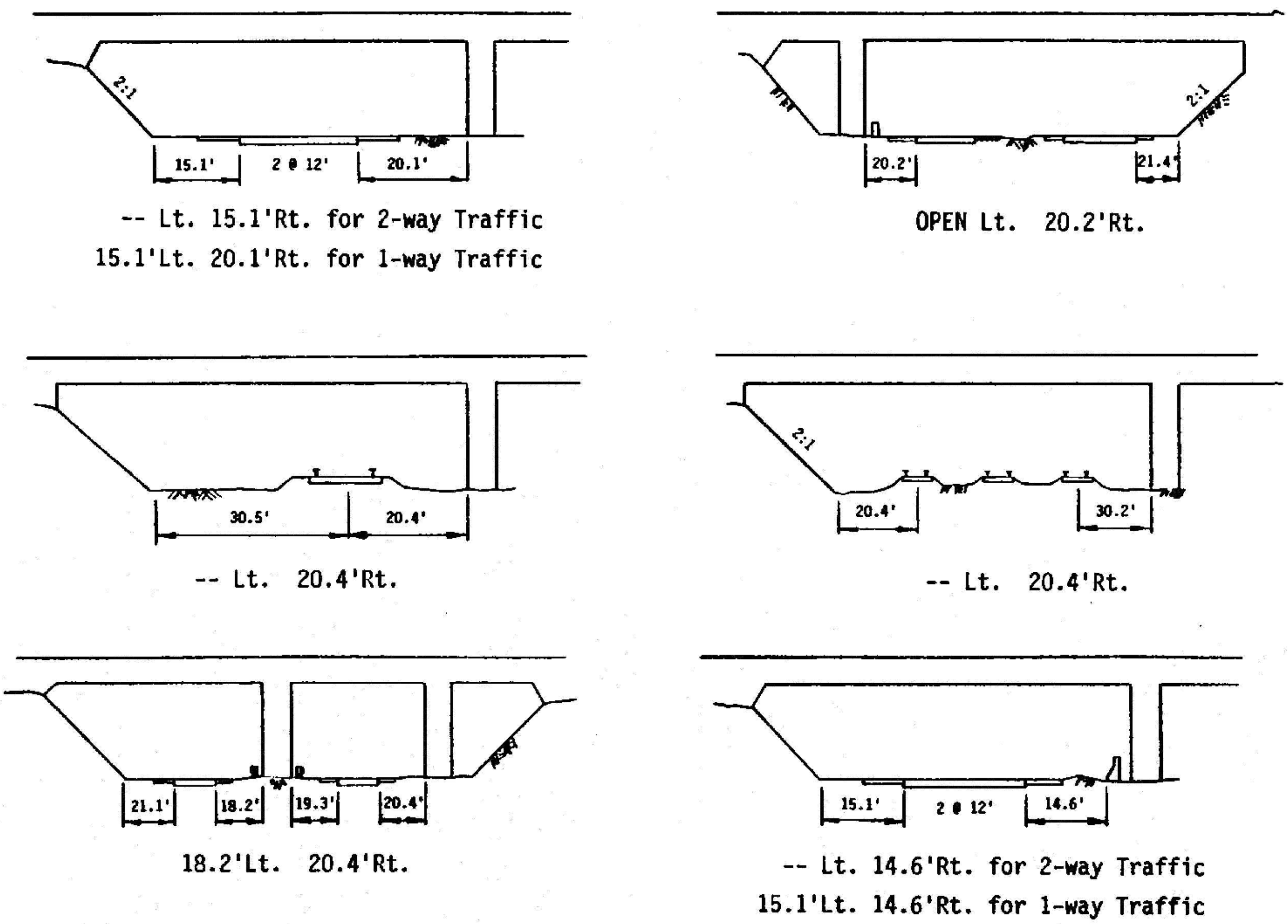


Figure 31: Example Right and Left Under Clearance

ITEM 56 – LEFT SIDE

This item is for divided highways, one-way streets, and ramps. It is not applicable to railroads.

Using a 5-digit number, code the minimum lateral under clearance on the left to the nearest hundredth of a foot. This is the median side for divided highways. The lateral clearance is measured from the left edge of the through roadway (excluding shoulders) to the nearest substructure, rigid barrier, or toe of slope steeper than 3 to 1. Refer to examples under the previous item (Item 55B - Minimum Lateral Under Clearance on Right.)

In the case of a dual highway, the median side clearances of both roadways are measured and the smaller distance is recorded and coded. If there is no obstruction in the median area, a notation of "open" is noted on the form and "99.99" coded. For clearances greater than 99.8 feet, code "99.80". Code "N" to indicate not applicable.

ITEM 38—NAVIGATION CONTROL EXISTS

This field indicates whether the bridge crosses a body of water which is under navigational control. The presence of a bridge permit in the bridge file would indicate such control. This field contains the parameters listed below:

<u>**Parameters**</u>

Permit not required

Permit required

N/A – no waterway

ITEM 39 — NAVIGATION VERTICAL CLEARANCES

This is a 4-digit field which indicates the minimum vertical clearance that is allowable for navigation purposes. If Item 38 - Navigation Control has been coded "Permit not required" or "N/A – no waterway", code the item as "0" to indicate that it is not applicable. If Item 38 has been coded "Permit required" enter the minimum vertical clearance to the nearest tenth of a foot imposed at the site, as measured above a datum specified on a navigation permit issued by the control authority. The measurement is coded as a 4-digit number, rounded down to the nearest tenth of a foot. This measurement will show the clearance that is allowable for navigational purposes. The decimal point can be omitted if not required, but it should be included when needed.

In the case of a swing or bascule bridge, the vertical clearance is measured with the bridge in the closed position (i.e., open to vehicular traffic). The vertical clearance of a vertical lift bridge is measured with the bridge in the raised or open position. Also, note that the clearance coded for Item 116 - Minimum Vertical Lift Clearances is for the closed position.

<u>**Examples:**</u>

Measured Vertical Clearance	Code
Item 38 coded as "N/A"	0
50' 00"	50.0 *(or 50)*

20’ 10”	20.8
24’ 11”	24.9 (always round down to be more restrictive)

ITEM 40—NAVIGATION HORIZONTAL CLEARANCES

This 5-digit field is coded only if Item 38 - Navigation Control Exists has been coded “Permit required”, in which case this item is recorded as the minimum horizontal clearance to the nearest tenth of a foot. This measurement is shown on the navigation permit and 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 as a 5-digit number rounded down to the nearest tenth of a foot. Code "0" if Item 38 - Navigation Control is coded “Permit not required” or “N/A – no waterway”

Examples:

Horizontal Clearance	Code
Item 38 coded as "0"	0
53’ 11”	53.9 *(always round down to be more restrictive)*
95’ 00“	95.0
553’ 9“	553.7 *(always round down to be more restrictive)*

ITEM 116—MINIMUM VERTICAL LIFT CLEARANCES

This field consists of 4 digits. Record to the nearest tenth of a foot (rounded down) the minimum vertical clearance imposed at the site, measured above a datum specified on a navigation permit issued by the control authority. Code this item only for vertical lift bridges in the dropped or closed position, otherwise code "0.000"

Examples:

Vertical Clearance	Code
Not a Vertical Lift Bridge	0
10’ 0”	10.0
24’ 11”	24.9 *(always round down to be more restrictive)*

LOAD RATING REVIEW RECOMMENDED

This field is a check box. If the box is checked, then it means the structure has been recommended to be load rated. If the box is not checked, then it means that this structure has not been recommended to be load rated.

RATING DATE

This item is the date when the structure was rated or when the last load rating event was entered or published.

ITEM 31—DESIGN LOAD

This item indicates the live load for which the structure was designed. For railroads, the numerical value of the railroad loading is recorded on the form. Classify any other loading, when feasible, using the nearest equivalent of the following loadings. This information is given on the bridge plans or bridge card if available. This field contains the parameters listed below:

Code	Description
1	H 10
2	H 15
3	HS 15
4	H 20
5	HS 20
6	HS 20 + Mod
7	Pedestrian
8	Railroad
9	HS 25
A	HL 93
B	Greater than HL 93
C	Other
0	Other or Unknown

ITEM 70—POSTING

This item identifies if posting is required and to what extent. The National Bridge Inspection Standards require posting of load limits only if the maximum legal load in the State produces stresses in excess of the operating stress level permitted under the operating rating.

The codes "0" through "5" are used to indicate the percentage difference between the maximum legal load and the operating rating capacity. This field contains the parameters listed below:

Code	Relationship of Operating Rating to Maximum Legal Load
5	Equal to or above maximum legal load (Posting not required)
4	0.1 to 9.9% below maximum legal load (Posting required)
3	10.0 to 19.9% below maximum legal load (Posting required)
2	20.0 to 29.9% below maximum legal load (Posting required)
1	30.0 to 39.9% below maximum legal load (Posting required)
0	More than 39.9% below maximum legal load (Posting required)

This item evaluates the load capacity of a bridge in comparison to the state legal load. It differs from Item 67 - Structural Evaluation in that Item 67 uses Item 66 - Inventory Rating, while the bridge posting requirement is based on Item 64 - Operating Rating.

Although posting a bridge for load-carrying capacity is required only if the maximum legal load exceeds the operating rating capacity, highway agencies may choose to post at less than the operating rating capacity. There may be instances when Item 70 is coded to show that no posting is required, yet the State or local government has decided to post at less than the operating rating. Thus, Item 41 – Open/Posted/Closed and Item 70 will appear to be in conflict. This coding practice is correct and acceptable, because the two items have different purposes and criteria. Item 70 shall be coded "4" or less only if the legal load of the state exceeds that permitted under the operating rating.

Posting a temporary bridge for load-carrying capacity requires special consideration. The load-carrying capacity of the temporary bridge reflects its actual capacity at the operating rating. However, the highway agency may choose to post at a lower level. This also applies to bridges with temporary repairs or shoring.

ITEM 63—OPERATING TYPE

This item identifies which load rating method was used to determine the operating rating coded in Item 64 for this structure. This item is entered by the Bridge Rating and Load Testing section of the ALDOT Maintenance Bureau.

Code	Description
0	Field evaluation and documents
1	Load Factor Design (LFD)
2	Allowable Stress Design (ASD)
3	Load and Resistance Factor Design (LRFD)
4	Load Testing
5	No rating analysis performed
6	Load Factor (MS18)
7	Allowable Stress (MS18)
8	LRFR (HL93)

A code of "0" should be used whenever the operating and inventory ratings are assigned (i.e., assigning values based on HS design level, visual inspections, etc.) instead of calculated.

ITEM 64—OPERATING RATING

This item identifies the operating rating, also known as capacity rating, refers to the maximum permissible loading to which the structure may be subjected for the vehicle type specified in the rating. This item is entered by the Bridge Rating and Load Testing section of the ALDOT Maintenance Bureau.

It should be emphasized that only HS loading shall be used to determine the operating rating.

Example:

Description	Code
HS 20 vehicle which has a weight of 36 tons	36.0
HS 15 vehicle which has a weight of 27 tons	27.0

The AASHTO *Manual for Bridge Evaluation* provides a choice of load rating methods, such as the load and resistance factor design (LRFD) rating method, in addition to the allowable stress design (ASD) and load factor design (LFD) methods.

If the bridge will not carry a minimum of 3 tons of live load, the operating rating shall be coded "00.0"; and consistent with the direction of the AASHTO Manual, it shall be closed.

Temporary bridges require special consideration in coding. In such cases, since there is no permanent bridge, Items 64 and 66 should be coded as "00.0" even though the temporary bridge is rated for as much as the full legal load. A bridge shored up or repaired on a temporary basis is considered a temporary bridge and the inventory and operating ratings are coded as if the temporary shoring were not in place. See Item 103 - Temporary Structure Designation for definition of a temporary bridge.

Code "99.9" for a structure under sufficient fill such that (according to AASHTO design) the live load is insignificant in the structure load capacity.

Examples:

Description	Code
HS20	48.0
Temporary bridge	00.0
Shored-up bridge	03.0*
Structure under fill (not affected by live load)	99.9

* load capacity without shoring

ITEM 65—INVENTORY TYPE

This item identifies which load rating method was used to determine the Inventory Rating coded in Item 66 for this structure. This item is entered by the Bridge Rating and Load Testing section of the Maintenance Bureau of ALDOT.

Code	Description
0	Field evaluation and documents
1	Load Factor Design (LFD)
2	Allowable Stress Design (ASD)
3	Load and Resistance Factor Design (LRFD)
4	Load Testing
5	No rating analysis performed
6	Load Factor (MS18)
7	Allowable Stress (MS18)
8	LRFR (HL93)

A code of "0" should be used whenever the operating and inventory ratings are assigned (i.e., assigning values based on HS design level, visual inspections, etc.) instead of computed.

ITEM 66—INVENTORY RATING

The inventory rating refers to the loading which can be safely applied to an existing bridge for an indefinite period of time. This rating is normally less than the corresponding operating rating. Only the HS loading will be used to determine the inventory rating. Code the inventory rating as a 3-digit number to represent the total weight in tons of the entire vehicle measured to the nearest tenth of a ton. The statements used for Item 64 - Operating Rating apply to Item 66 also.

Code "99.9" for a structure under sufficient fill such that (according to AASHTO design) the live load is insignificant in the structure load capacity.

Inventory – Admin Subtask

Structure Inventory and Appraisal

FORM: BI-6 — STR. NUM.: OAL0008 240075.014-1 — Date: ____________

BIN: 018022 — 1 REC — Sheet: 2

Printed: 10/17/2014

Inventory - Admin Subtask

STRUCTURAL IDENTIFICATION

		CURRENT	NEW
	AGENCY BRIDGE ID	018022	
8)	NBI STRUCTURE NO	018022	
	NAME		____________

LOCATION

		CURRENT	NEW
1A)	FIPS STATE	01 Alabama	____________
1B)	FHWA REGION	Region 4-Atlanta	____________
2)	DIVISION/AREA	Division 6	____________
3)	COUNTY	Dallas	____________
4)	CITY/TOWN/PLACECODE		____________
6A)	FEATURE INTERSECTED	CAHABA RIVER RELIEF NC	____________
7)	FACLITY CARRIED	US 80 WBL	____________
9)	LOCATION	4.8 MI. W. OF AL 219	____________
16)	LATITUDE	32D 26M 43.460S	___D___M___.___S
17)	LONGITUDE	87D 09M 57.830S	___D___M___.___S
98AA)	BORDER STATE	Not Applicable (P)	____________
98B)	SHARE(%)	0	____________%
98AB)	BORDER FHWA REGION	Not Applicable	____________
99)	BORDER STRUCT NO		____________

AGE AND SERVICE

		CURRENT	NEW
27)	YEAR BUILT	2004	____________
106)	YEAR RECONSTRUCT	0	____________
42A)	TYPE OF SERVICE ON	1 Highway	____________
42B)	UNDER	9 Relief for waterway	____________
28B)	LANES UNDER	0	____________

OPERATION

		CURRENT	NEW
21)	MAINT. RESP.	State Highway Agency	____________
22)	OWNER	State Highway Agency	____________
	ALDOT DISTRICT	District 5	____________

CLASSIFICATION INFOMATION

		CURRENT	NEW
112)	NBIS BRIDGE LENGTH	Long Enough	____________
101)	PARALLEL STRUCTURE	Left of || bridge	____________
103)	TEMPORARY STRUCTURE	Not Applicable (P)	____________
37)	HISTORIC SIGNIFICANCE	5 Not eligible for NRHP	____________

Figure 32: Admin Subtask

AGENCY BRIDGE ID

The Agency Bridge ID is Alabama's bridge identification number (BIN). The BIN is a unique 6- digit code used to identify each structure in the state. BIN's are progressive, sequential numbers assigned to all records in the state's bridge database. Only one BIN is assigned to each physical structure, and this BIN will never change during the life of the bridge. The BIN has no meaning other than to be a unique unchanging number assigned to the bridge structure.

All BIN's are assigned to each structure through the office of the Bridge Management Engineer in the Central Office of the Alabama Department of Transportation.

ITEM 008 – NBI STRUCTURE NO

This item is the same as Agency Bridge ID.

NAME

This identifies the name given to a specific structure (if applicable).

ITEM 001A – FIPS STATE

This item identifies the state which the structure resides in. All structures will be coded "01 Alabama".

ITEM 001B – FHWA REGION

This item identifies the FHWA region where the structure is located. All structures will be coded "Region 4 – Atlanta".

ITEM 002—AREA

This item identifies the Area where the structure is located.

This field contains the parameters listed below:

- Guntersville
- Tuscumbia
- Birmingham
- Alexander City
- Tuscaloosa
- Montgomery
- Troy
- Grove Hill
- Mobile
- Fayette

A map indicating area boundaries may be found in Appendix A of this manual.

When the bridge falls at the boundary between areas, it is identified as being in (and assigned to) the county or area to the west or south of the boundary. As a general rule, even numbered routes are understood to run from west to east, and odd numbered routes are understood to run from south to north. This method of assigning a bridge to a county and area is used unless a written agreement between the two counties or areas is on file in the bridge folder.

ITEM 003—COUNTY

This item identifies the county where the structure is located. A complete listing of the counties may be found in Appendix C of this manual.

When the bridge falls at the boundary between counties, it normally belongs to the west or south county. This method of assigning a bridge to a county is used unless a written agreement between the two counties is on file in the bridge folder in the bridge inspector's office.

ITEM 004—CITY/TOWN/PLACECODE

This item identifies the city, town, township, village, or other census-designated place where the structure is located. A complete listing of the cities, towns, townships, villages, or other census-designated places may be found in Appendix B of this manual.

If the structure does not fall within the boundary of a city/town/placecode, then “Unknown” shall be selected.

ITEM 006A—FEATURE INTERSECTED

This item is a 24 digit field that identifies the features intersected by the structure. When item 5A indicates an "under" record, this item describes the inventory route and/or features under the structure.

When one of the features intersected is another highway, the signed route number or name of the highway appears first (leftmost) in the field. The names of any other features follow, separated by semicolons or commas. Parentheses are used to provide a second identification of the same feature (see fourth example).

Examples:

L&N RAILROAD (ABANDONED)

I 20, US 78, MILL ROAD

ALA 6, WARRIOR RIVER

ALA 13 (POND ROAD)

ALAMUCHEE CRK.

ITEM 7—FACILITIES CARRIED

This item is an 18 digit field that identifies the facility being carried by the structure. In all situations this item describes the use "on" the structure, even when item 5A indicates an "under" record. The following examples illustrate proper coding.

<u>Examples</u>:
U. S. 80
COUNTY ROAD 450
US 98
MAIN STREET
C & 0 RAILROAD *(appropriate for "under" record only)*
PEDESTRIAN BRIDGE *(appropriate for "under" record only)*

ITEM 009—LOCATION

This item is a 25-digit descriptive narrative capturing where the bridge is located. It is recommended that the location be a distinguishable feature on an official Department map, such as a road junction or a recognizable topographical feature like a river.

The following examples illustrate proper coding:

<u>Examples</u>:

1.5 mi. E OF JCT US 11
6.0 mi. SW OF ELBA
3.5 mi. S OF JCT ALA 20
4.1 mi. N OF WARRIOR R

ITEM 016—LATITUDE

This item identifies the latitude of each structure in degrees, minutes, and seconds to the nearest hundred of a second. This is an 8-digit field. The degrees of latitude for the state of Alabama must be between 30 to 35 degrees. The location of the point to be coded is usually at the beginning of the bridge in the direction of the inventory route or any other consistent point of reference on the bridge which is compatible with the LRS. The reason for the specified precision is to facilitate the use of Global Positioning System (GPS) data directly into this item. If GPS readings are not available, the most accurate measuring methods available and level of precision may be used. The preferred precision is to the nearest hundred of a second. The following example illustrates the coding:

<u>Example</u>	<u>Code</u>
Latitude is 33^{o}, 27', 18.55"	33d 27’ 18.55” *(to match GPS)*

ITEM 017—LONGITUDE

This item identifies the longitude of each structure in degrees, minutes, and seconds to the nearest hundred of a second. This is an 8-digit field. The degrees of longitude for the State of Alabama must be between 84 to 88 degrees. The location of the point to be coded is usually at the beginning of the bridge in the direction of the inventory route or any other consistent point of reference on the bridge which is compatible with the LRS. The reason for the specified precision is to facilitate the use of Global Positioning System (GPS) data directly into this item. If GPS readings are not available, the most accurate measuring methods available and level of precision may be used. The preferred precision is to the nearest hundred of a second. The following example illustrates the coding:

Example	Code
Longitude is 84^{o}, 5', 50.65"	084d 05’ 50.65” *(to match GPS)*

ITEM 098AA—BORDER STATE

This item identifies any structures that cross the Alabama border. If a structure crosses the Alabama border into a neighboring state, it will need to be coded as one of the following states:

Parameters
Florida
Georgia
Mississippi
Tennessee

If this structure is not on an Alabama border then this field will need to be coded “Not Applicable”.

ITEM 098B – SHARE (%)

This item identifies the percentage of total deck area of an existing bridge that the neighboring State is responsible for funding.

If a neighboring state codes the structure and accepts 100% of the responsibility, but Alabama still codes a record for the structure, then Item 098B should be coded "99" to represent that Alabama has no responsibility for the structure. Two examples are shown below to illustrate share coding:

	Share(%)
A structure connects Alabama and Georgia and Georgia is responsible for funding 45 percent of future improvement costs.	45
A structure connects Alabama and Mississippi and Mississippi is not responsible for any funding of future improvement costs.	00

If the structure is not on a state border, code this field ‘0’.

ITEM 098AB – BORDER FHWA REGION

This item identifies the FHWA Region for all structures that have a border state. If the structure is coded as having a border state then this field will need to be coded “Region 4 – Atlanta”. If the structure does not have a border state then this field will need to be coded “Not Applicable”

ITEM 099—BORDER STRUCTURE NUMBER

This item identifies the border state’s structure number. If the structure has a border state then the neighboring State’s 15-digit National Bridge Inventory structure number should be coded here. This number must match the neighboring State’s submitted NBI structure number. The entire 15-digit field must be accounted for including zeroes and blank spaces whether they are leading, trailing, or embedded in the 15-digit field. If Item 98 is coded “Not Applicable” then this item must be left blank.

ITEM 027—YEAR BUILT

Enter the year of construction of the structure. Code all 4 digits of the year in which construction of the structure was completed. If the year built is unknown, provide a best estimate. Do not enter the year of reconstruction, which is described by item 106.

Examples:		**Code**
Construction completed:	1954	1954
	1956	1956
	1892	1892

ITEM 106—YEAR RECONSTRUCT

Enter a 4-digit code for the year of the most recent reconstruction of the structure. Code all 4 digits of the latest year in which reconstruction of the structure was completed. If there has been no reconstruction, code "0000."

For a bridge to be defined as reconstructed, 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 the amount of Federal-aid, State, or local funds used.

Some examples of the types of eligible work that are not considered as reconstruction are shown in the following list:

(1) Safety feature replacement or upgrading (for example, bridge rail, approach guardrail, or impact attenuators).

(2) Painting of structural steel.

(3) Overlay of bridge deck as part of a larger highway surfacing project (for example, overlay carried across bridge deck for surface uniformity without additional bridge work).

(4) Utility work.

(5) Emergency repair to restore structural integrity to the previous status following an accident.

(6) Retrofitting to correct a deficiency which does not substantially alter physical geometry or increase the load-carrying capacity.

(7) Work performed to keep a bridge operational while plans for complete rehabilitation or replacement are under preparation (for example, adding a substructure element or extra girder).

Examples:	Code
Bridge has never been reconstructed	0000

Bridge was reconstructed in 1984	1984
Bridge was reconstructed in 1954 and 1986	1986

ITEM 042A—TYPE OF SERVICE

This item identifies the type of service "on" the bridge using one of the followingparameters:

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

ITEM 042B—UNDER

This item identifies the type of service "under" the bridge using one of the following parameters:

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

ITEM 28B—LANES UNDER

This item identifies the number of lanes under the structure. It includes all lanes carrying highway traffic (i.e., cars, trucks, buses) that are striped or otherwise operated as a full width traffic lane for the entire length of the structure or under the structure by the owning/maintaining authority. This also includes any full width merge lanes and ramp lanes, and is independent of direction of usage (i.e., a 1-lane bridge carrying 2-directional traffic is still considered to carry only one lane on the structure).

ITEM 021— MAINTENANCE RESPONSIBILITY

This item identifies the agency that has primary responsibility for maintaining the structure. If more than one agency has equal maintenance responsibility, select the agency highest in the hierarchy of State, Federal, county, city, railroad, and private. This field contains the parameters listed below:

Code	Description
01	State Highway Agency
02	County Highway Agency
03	Town or Township Highway Agency
04	City or Municipal Highway Agency
11	State Park, Forest, or Reservation Agency
12	Local Park, Forest, or Reservation Agency
21	Other State Agencies
25	Other Local Agencies
26	Private (other than railroad)
27	Railroad
31	State Toll Authority
32	Local Toll Authority
60	Other Federal Agencies (not listed below)
61	Indian Tribal Government
62	Bureau of Indian Affairs
63	Bureau of Fish and Wildlife
64	U.S. Forest Service
66	National Park Service
67	Tennessee Valley Authority
68	Bureau of Land Management
69	Bureau of Reclamation
70	Corps of Engineers (Civil)
71	Corps of Engineers (Military)
72	Air Force
73	Navy/Marines
74	Army
75	NASA
76	Metropolitan Washington Airports Service
80	Unknown

ITEM 022—OWNER

This item identifies the owner of the bridge. If more than one agency has equal ownership of the structure, select the agency highest in the hierarchy of State, Federal, county, city, railroad, and private. The parameters for this item are the same parameters used for Item 021 – Maintenance Responsibility.

ALDOT DISTRICT

This item identifies the Departments district where the bridge is located. A map indicating the district boundaries may be found in Appendix A of this manual. The parameters in this field are District 1 through District 6.

When a bridge falls on the boundary between two districts, it is identified as being in (and assigned to) the district to the west or south of the boundary. This method of assigning a bridge to a district is used unless a written agreement between the two districts is on file in the bridge folder.

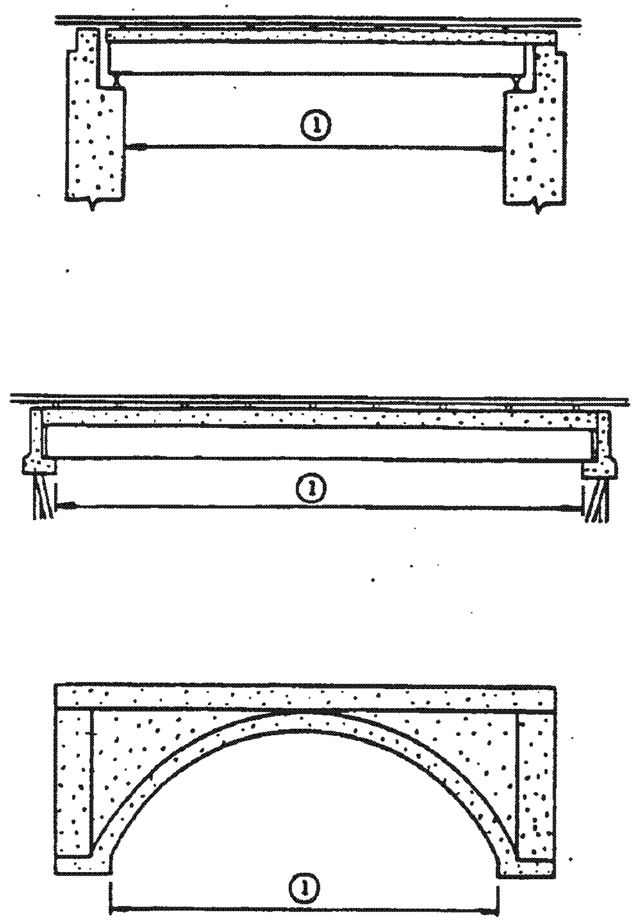
ITEM 112—NBIS BRIDGE LENGTH

This item identifies whether the structure meets or does not meet the minimum length specified for a bridge as designated by the National Bridge Inspection Standards as given below. This field contains the parameters listed below:

Parameters
Long Enough
Too Short

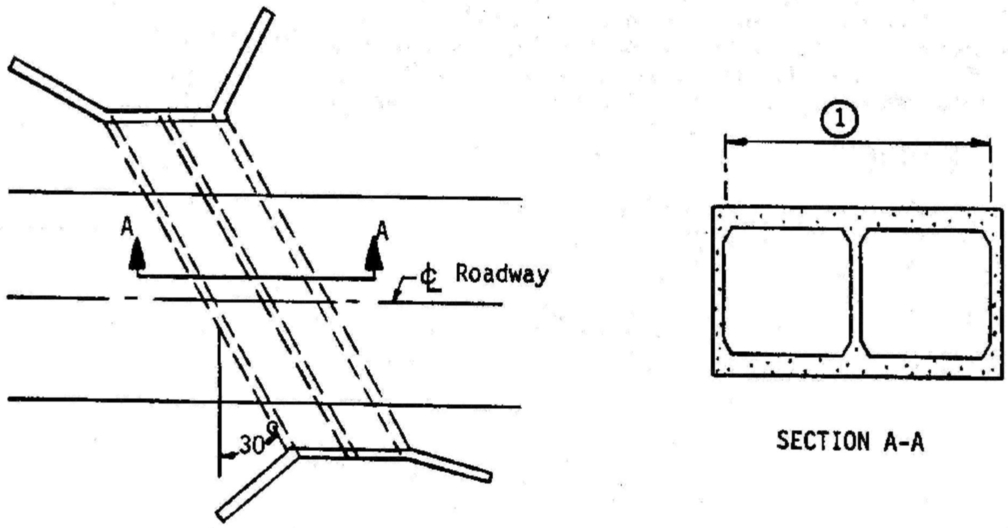
A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments 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.

Examples:

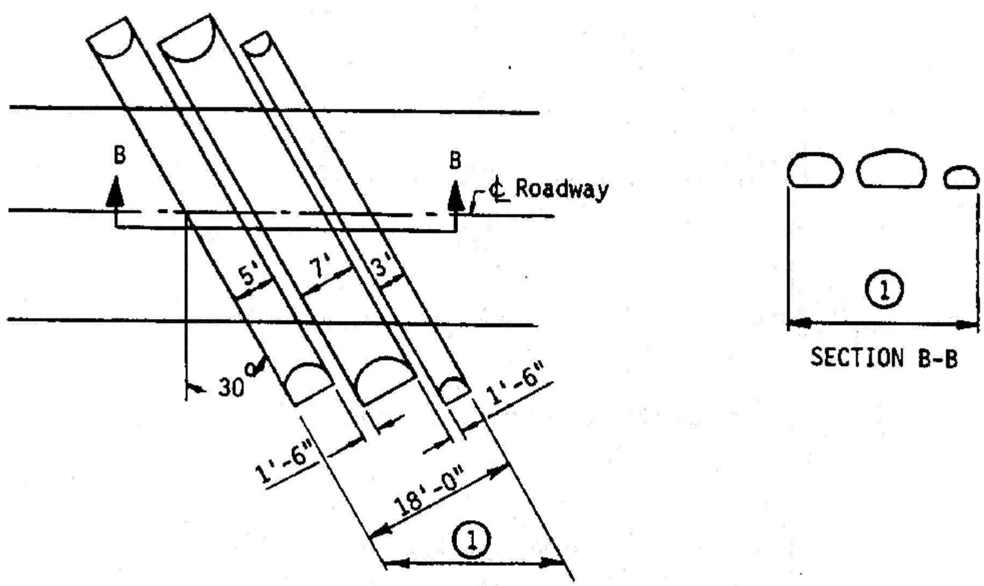


(1) Item 112 - NBIS Bridge Length

Figure 33: Examples of Measurement of Item 112.



(1) Item 49 - Structure Length



(1) Item 112 - NBIS Bridge Length $= \dfrac{18'}{\cos 30^\circ} = 20.78'$

Figure 34: Examples of Measurement of Item 112.

ITEM 101—PARALLEL STRUCTURE

This item identifies 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. This field contains the parameters listed below:

Code	Description
No parallel structure exists	This structure does not have a parallel structure.
Left of parallel bridge	This structure carries traffic in the opposite direction of the route.
Right of parallel bridge	This structure carries traffic in the direction of the route.

Examples:	Code
Structure #1	Right of parallel bridge
Structure #2	Left of parallel bridge

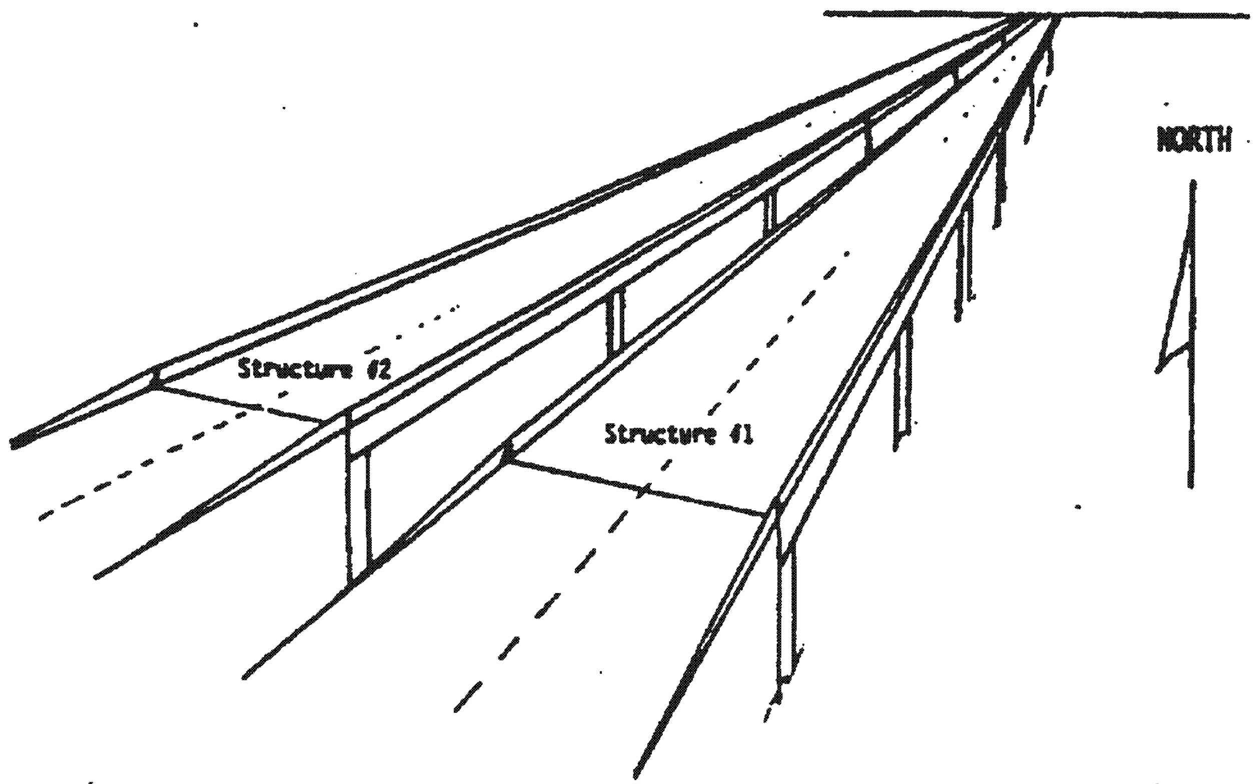


Figure 35: Examples for Item 101-Parallel Structure Designation

ITEM 103—TEMPORARY STRUCTURE DESIGNATION

This item identifies if a temporary structure or condition exists. If a temporary structure exists, select “T Temporary”, if a temporary structure does not exists, select “Not Applicable (P)”.

Temporary structure(s) or conditions are erected to facilitate traffic flow, either before or during modification or replacement of a deficient structure. Such temporary structures may include the following:

1. Bridges shored up, including additional temporary support.
2. Temporary repairs made to keep a bridge open.
3. Temporary structures, temporary runarounds or bypasses.
4. Bridges that have temporary strength or support improvements to increase the load carrying capacity.
5. Other temporary measures, such as barricaded traffic lanes to keep the bridge open.

Temporary work is defined as a repair activity that is intended to keep the structure in some level of service until such a time it can be replaced. Given that replacement funds are limited, temporary work on a structure may be required to allow the structure to remain in service for a number of years. Temporary work is generally supplementary in nature. A common example is the addition of false bents. Work that is "in kind", such as repair decks, is not considered temporary. Under such conditions, that structure, regardless of its type is considered minimally adequate to remain in place and evaluated accordingly.

If this item is coded "T Temporary," all recorded data is for the conditions of the structure without temporary measures, except for the following items which are for the temporary structure.

Item	Description
10	Inventory Route, Minimum Vertical Clearance
41	Structure Open, Posted, or Closed to Traffic
47	Inventory Route, Total Horizontal Clearance.
53	Minimum Vertical Clearance Over Bridge Roadway
54	Minimum Vertical Under Clearance
55	Minimum Lateral Under Clearance on Right
56	Minimum Lateral Under Clearance on Left
70	Bridge Posting

ITEM 037—HISTORIC SIGNIFICANCE

This item identifies the historical significance of the bridge. The historic significance of a bridge involves a variety of characteristics. The bridge may be a particularly unique example of the history of engineering; the crossing itself might be significant; the bridge might be associated with a historical property or area; or historical significance could be derived from the bridge's association with significant events or circumstances. Use one of the following parameters to denote historical significance. Note that all new bridges are to be coded "5 Not eligible for NRHP." Bridge inspectors will be notified by the Central Office of any structures which have a code other than "5."

Code	Description
1	Bridge is on the National Register of Historic Places.
2	Bridge is eligible for the National Register of Historic Places.
3	Bridge is possibly eligible for the National Register of Historic Places (further investigation is required before determination can be made) or bridge is on a State or local historic register.
4	Historical significance is not determinable at this time.
5	Bridge is not eligible for the National Register of Historic Places.

Inventory – Design Subtask

Structure Inventory and Appraisal

FORM: BI-6 | STR. NUM.: OAL0008 240075.014-1 | Date: ______________ | Sheet: 3

BIN: 018022 | 1 REC | Printed: 10/17/2014

Inventory - Design Subtask

DECK

		CURRENT	NEW
107)	DECK STRUCTURE TYPE	1 Concrete-Cast-in-Place	______
108A)	DECK SURFACE TYPE	1 Monolithic Concrete	______
108B)	DECK MEMBRANE TYPE	0 None	______
108C)	DECK PROTECTION	None	______
50A)	CURB SIDEWALK WIDTH/LEFT	0.00 ft	______ft
50B)	CURB SIDEWALK WIDTH/RIGHT	0.00 ft	______ft
52)	DECK WIDTH	42.90 ft	______ft
33)	BRIDGE MEDIAN	1 Open median	______
	DECK AREA	7,293.00	______(SF)

STRUCTURE STATUS

	CURRENT	NEW
BRIDGE STATUS	3 Active	______

SPANS

		CURRENT	NEW
45)	NUMBER OF MAIN SPANS	5	______
43A)	MAIN SPANS MATERIAL	1 Concrete	______
43B)	MAIN SPANS DESIGN	02 Stringer/Girder	______
46)	NUMBER OF APPROACH SPANS	0	______
44A)	APPROACH SPAN MATERIAL	Not Applicable (P)	______
44B)	APPROACH SPAN DESIGN	Not Applicable (P)	______
34)	SKEW	0 D	______D
35)	STRUCTURE FLARED	0 No flare	______

LENGTH

		CURRENT	NEW
48)	MAXIMUM SPAN LENGTH	34.00 ft	______ft
49)	STRUCTURE LENGTH	170.00 ft	______ft
	TOTAL LENGTH	170.00 ft	______ft

Figure 36: Design Subtask

ITEM 107—DECK STRUCTURE TYPE

This item identifies the type of deck system on the bridge. If a bridge has more than one deck system, code the most predominant. Code "Not Applicable" for a culvert or arch with an earth fill over it, and the approach roadway section is carried across the structure. This field contains the parameters listed below:

Code	Description
1	Concrete Cast-in-Place
2	Concrete Precast Panels
3	Open Grating
4	Closed Grating
5	Steel plate (includes orthotropic)
6	Corrugated Steel
7	Aluminum
8	Wood or Timber
9	Other
N	Not applicable

ITEM 108A—DECK SURFACE TYPE

This item identifies the type of wearing surface on the structure. This field contains the parameters listed below:

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
7	Wood or Timber
8	Gravel
9	Other
0	None (no additional concrete thickness or wearing surface is included in the bridge deck)
N	Not Applicable (applies only to structures with no deck, e.g. culvert with fill)

SUBITEM 108B-DECK MEMBRANE TYPE

This item identifies the material or type of construction used in any membrane associated with the wearing surface. This field contains the parameters listed below:

Code	Description
1	Built-up
2	Preformed Fabric

3	Epoxy
8	Unknown
9	Other
0	None
N	Not Applicable (applies only to structures with no deck)

A top or surface coating of epoxy, or any similar material, with or without sand, does not qualify as a membrane. Only a material designed as a water barrier and placed concurrently with an overlay qualifies.

ITEM 108C-DECK PROTECTION

This item is used to capture the type of deck protection. This field contains the parameters listed below:

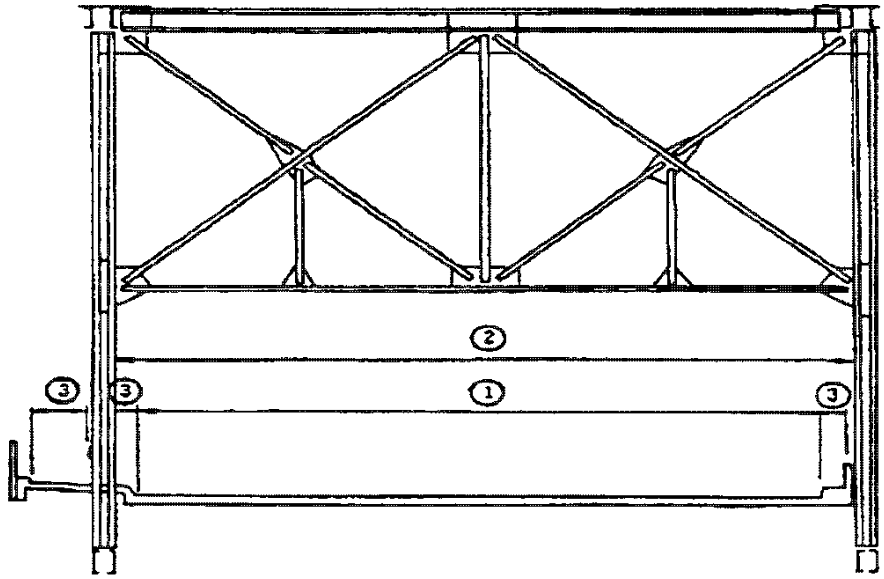
Code	Description
1	Epoxy Coated Reinforcing
2	Galvanized Reinforcing
3	Other Coated Reinforcing
4	Cathodic Protection
6	Polymer Impregnated
7	Internally Sealed
8	Unknown
9	Other
0	None
N	Not Applicable (applies only to structures with no deck)

ITEM 050A — CURB SIDEWALK WIDTH/LEFT

This item identifies the width of the left curb or sidewalk on the structure. "Left" and "Right" are determined on the basis of the direction of the inventory route. Measurements are made to the nearest hundredth of a foot. The total length of this field is 5 digits.

ITEM 050B — CURB SIDEWALK WIDTH/RIGHT

This item identifies the width of the right curb or sidewalk on the structure. "Left" and "Right" are determined on the basis of the direction of the inventory route. Measurements are made to the nearest hundredth of a foot. The total length of this field is 5 digits.

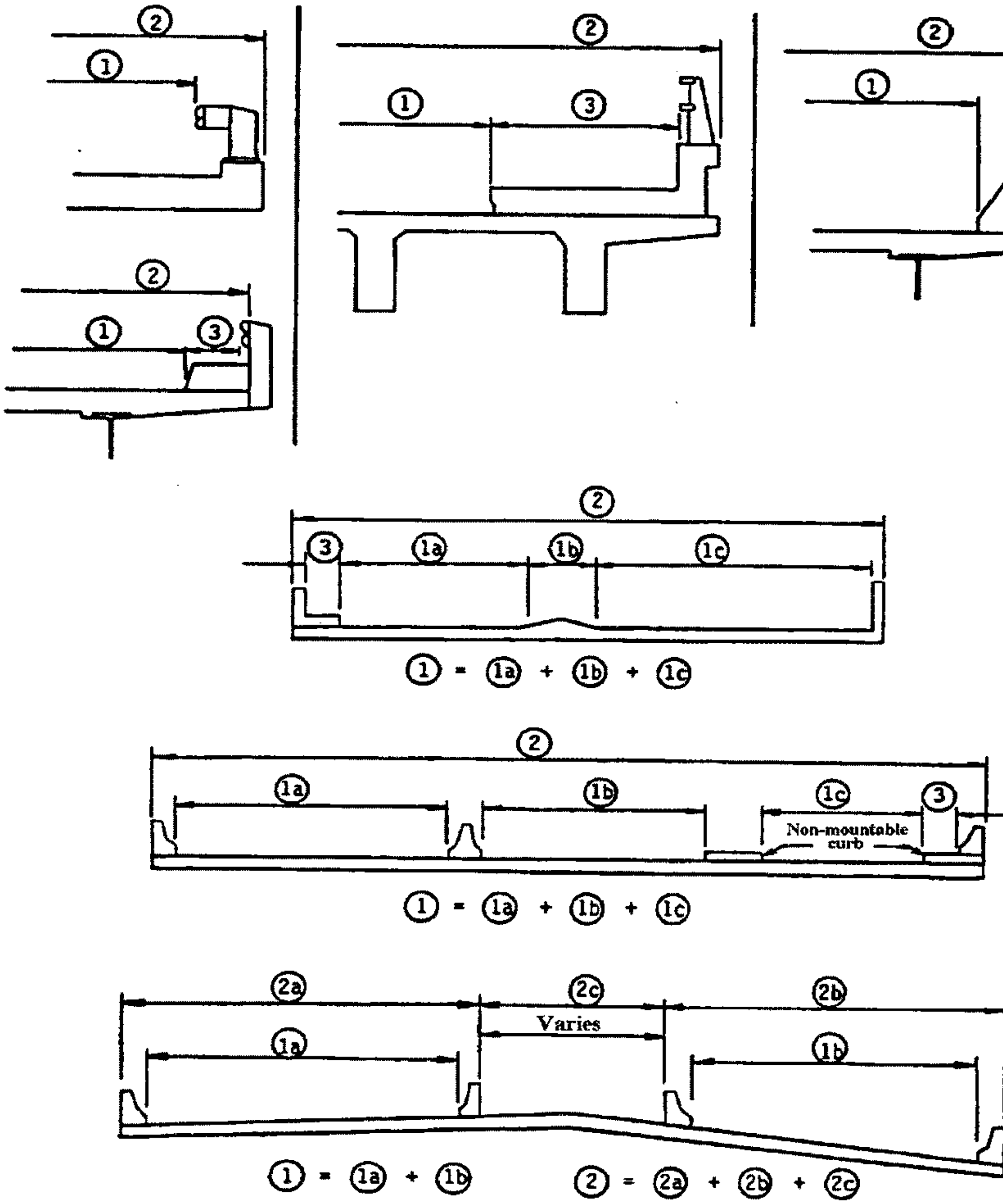


1 Item 51 - Bridge Roadway Width, Curb-to-Curb
2 Item 52 - Deck Width, Out-to-Out
3 Item 50 - Curb or Sidewalk Width

Figure 37: Examples for Items 50, 51 and 52

Item 50 - Curb or Sidewalk Widths (cont'd)

EXAMPLES:



(1) Item 51 - Bridge Roadway Width, Curb-to-Curb
(2) Item 52 - Deck Width, Out-to-Out
(3) Item 50 - Curb or Sidewalk Width

Figure 38: Examples for Items 50, 51 and 52

Examples:

	Left Side	Right Side	Code 50a	Code 50b
Curb or Sidewalk	None	2.3 feet	0.000	2.300
	3 feet	4.1 feet	3.000	4.100
	3. 3 feet	None	3.300	0.000
	12.1 feet	11.5 feet	12.100	11.500
	None	None	0.000	0.000
	6 feet	1.5 feet	6.000	1.500
	22.31 feet	11.29 feet	22.310	11.290

(See figures 37 and 38 for additional examples.)

ITEM 052—DECK WIDTH

This item identifies the out-to-out width of the deck. This entry consists of a 5-digit number representing the measured to the nearest tenth of a foot. If the structure is a through structure such as a truss, this item represents the distance between superstructure members, otherwise the actual out- to-out width of deck of the structure is coded. If 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 "0.000". This is considered proper as a filled section over a culvert simply maintains the roadway cross-section. However, for sidehill viaduct structures, code the actual out-to-out structure width (see Figure 5-8A).

The measurement should be exclusive of flared areas for ramps. Where traffic runs directly on the top slab (or wearing surface) of the culvert, (e.g., a reinforced concrete 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. See the examples shown in Figures 37 and 38.

ITEM 033—BRIDGE MEDIAN

This item identifies the type of median on the structure. This field contains the parameters listed below:

Code	Description
0	No median
1	Open median
2	Closed median (no barrier)
3	Closed median with non-mountable barriers

The median is closed when the area between the two roadways at the structure is bridged over and is capable of supporting traffic, as shown in Figure 39. All bridges that either carry one-way or two- way traffic separated only by a centerline will be coded "0" for no median.

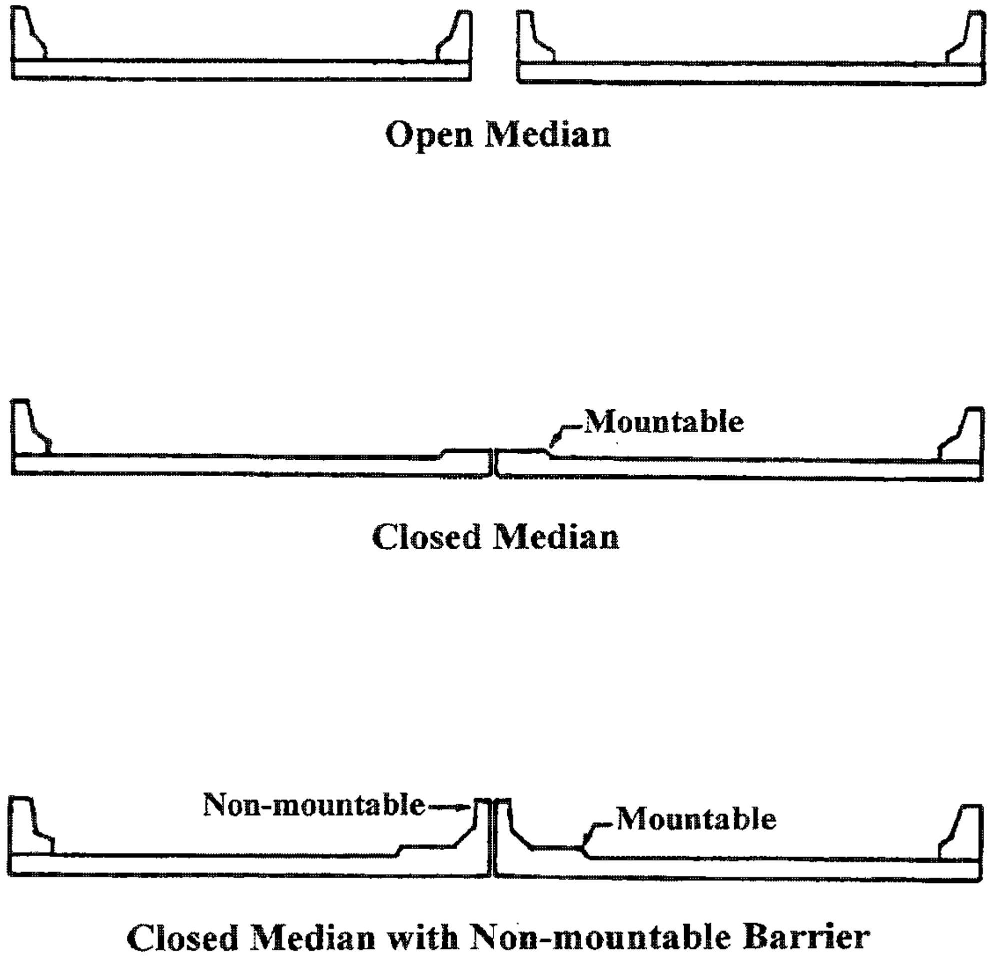


Figure 39: Example for Item 33

DECK AREA

This item is the area of the deck in square feet. To calculate this item you will multiply Structure Length – Item 49 by Deck Width – Item 52.

BRIDGE STATUS

This item identifies the status of the bridge. This field contains the parameters listed below:

Code	Description
Inactive	Structure not in service (either removed or closed permanently with no plans to replace.
Active	Structure is currently in service.
Proposed	Structure is planned, under design/construction, or otherwise not yet in service.

ITEM 045—NUMBER OF MAIN SPANS

This item identifies 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 on some bridges it may describe a unit of material or design different from that of the approach spans.

In Alabama, the main spans are normally considered to be the portion of the structure which actually go across the river (or road or railroad, etc.). For the majority of all bridges in this state, the main spans comprise the whole structure, or the main spans are easily distinguished from the approach spans.

For complex structures or unusual situations where it is difficult to tell the difference in the main span and the approach spans, the inspector may contact the Bridge Section of the Maintenance Bureau in the Central Office.

ITEM 043A—MAIN SPANS MATERIAL

This item identifies the kind of material and/or design for the main span of the bridge. This field contains the parameters listed below:

Code	Description
1	Concrete
2	Concrete continuous
3	Steel
4	Steel continuous
5	Prestressed concrete *
6	Prestressed concrete continuous *
7	Wood or Timber
8	Masonry
9	Aluminum, Wrought Iron, or Cast Iron
0	Other

* Post-tensioned concrete should be coded as prestressed concrete.

ITEM 043B—MAIN SPANS DESIGN

This item identifies the predominant type of design and/or type of construction for the main span of the bridge. This field contains the parameters listed below:

Code	Description
01	Slab
02	Stringer/Multi-beam or Girder
03	Girder and Floorbeam System
04	Tee Beam
05	Box Beam or Girders - Multiple
06	Box Beam or Girders - Single or Spread
07	Frame (except frame culverts, code 19)
08	Orthotropic
09	Truss - Deck
10	Truss - Thru

11	Arch - Deck
12	Arch - Thru
13	Suspension
14	Stayed Girder
15	Movable - Lift
16	Movable - Bascule
17	Movable - Swing
18	Tunnel
19	Culvert (includes frame culverts)
20*	Mixed types
21	Segmental Box Girder
22	Channel Beam
00	Other

*Applicable only to approach spans, see Item 44

	Code	
Examples:	43A	43B
Timber stringer/multi-beam or girder	7	02
Concrete Tee Beam	1	04
Timber Through Truss	7	10
Masonry Culvert	8	19
Steel Suspension	3	13
Continuous Concrete Multiple Box Girders	2	05
Simple Span Concrete Slab	1	01
Tunnel in Rock	0	18
Concrete Box Culvert	1	19

ITEM 46—NUMBER OF APPROACH SPANS

This item identifies the number of approach spans before and/or after the main spans of the bridge, or the number of spans of material different from that of the main spans.

If there are no approach spans, code this item "0".

ITEM 044A—APPROACH SPAN MATERIAL

This item identifies the type of material and/or design for the approach spans to a major bridge, or to describe spans composed of different structural materials.

The parameters for this item are the same as Item 43A-Main Spans Material. Enter a code of "Not Applicable" if there are no approach spans. If the kind of material is varied, enter the code for the most predominant.

ITEM 044B—APPROACH SPAN DESIGN

This item identifies the type of design for the approach spans to a major bridge, or to describe spans composed of different structural materials.

The parameters for this item are the same for Item 43B-Main Spans Design. Enter a code of "Not Applicable" if there are no approach spans. Use "20" when no one type of design or construction is predominate for the approach units.

	Code	
Examples:	44A	44B
No approach spans	N/A	N/A
Simple prestressed concrete I-beam	5	02
Continuous concrete T-beam	2	04
Continuous steel deck truss	4	09

ITEM 034—SKEW

This item identifies the angle, less than 90 degrees, measured to the nearest degree, between the centerline of a pier and a line perpendicular 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 field measured. When the structure is on a curve or if the skew angle varies for some other reason, the average angle is recorded, if reasonable. Otherwise, record "99" to indicate a major variation in skews of the substructure units. This field contains the parameters listed below:

Examples:

Skew Angle	Code
0	00
10	10
8	08
29	29

ITEM 035—STRUCTURE FLARED

This item identifies if the structure is flared (i.e., the width of the structure varies). Generally such variance results 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. This field contains the parameters listed below:

Code	Description
1	Yes, structure is flared
0	No, structure is not flared

ITEM 048—MAXIMUM SPAN LENGTH

This item identifies the length of the maximum span measured to the nearest tenth of a foot. The measurement is made along the centerline of the bridge, and the inspector writes on the BI-6 form whether the measurement is center to center of bearing points or clear open distance between piers, bents, or abutments. For culverts this distance is to represent the maximum barrel width.

Examples:

Length of Maximum Span	Code
1222’ 4”	1222.3
40’ 4”	40.3 *(leading zeroes not required)*
117’ 0”	117.0 *(or 117, decimal is not required for this case)*

ITEM 049—STRUCTURE LENGTH

This item identifies the length of the entire structure measured to the nearest tenth of a foot. The measurement is made along the centerline of the roadway. For bridges, the length is the distance from paving notch to paving notch (or back to back of abutment walls). Tunnel length should be measured along the centerline of the roadway. For culverts, the length is the distance between inside faces of exterior walls. Culvert lengths should be measured along the centerline of roadway regardless of their depth below grade. Figures 2-2 and 2-3 illustrate the measurement.

Examples:

Structure Length	Code
120’ 1”	120.1 *(Leading zeroes need not be entered)*
103’ 6”	103.5
333’ 0	333.0 (*or 333, decimal is not required for this case)*
10,123’ 5”	10123.4
20,111’ 1”	20111.0

TOTAL LENGTH

This item identifies the total length of the structure. This item should be the same length as Structure Length – Item 49.

Inventory – Roads Subtask

FORM: BI-6 | Structure Inventory and Appraisal | Date: ______________
STR. NUM.: OAL0008 240075.014-1 | Sheet: 4
BIN: 018022 | 1 REC | Printed: 10/17/2014

Inventory - Roads Subtask

IDENTIFICATION

		CURRENT	NEW
	ROAD/ROUTE NAME	US 80 WBL	______________
5A)	POSITION/PREFIX	Route On Structure	______________
5B)	KIND HWY (RT PREFIX)	2 U.S. Numbered Hwy	______________
5C)	DESIG. LEVEL SERVICE	1 Mainline	______________
5D)	RTE#	00080	______________
5E)	SUFFIX	0 N/A (NBI)	______________
6B)	CRITICAL FACILITY	* Defense-critical	______________

HIGHWAY NETWORKS & SERVICE CLASSIFICATION

		CURRENT	NEW
11)	KILOMETER/MILE POINT	75.014 mi	______________mi
12)	NATIONAL BASE NET	On Base Network	______________
13A)	LRS INVENTORY RTE	000AL00080	______________
13B)	SUB#	00	______________
20)	TOTAL FACILITY	3 On free road	______________
26)	FUNCTIONAL CLASS	02 Rural Other Princ	______________
102)	TRAFFIC DIRECTION	1 1-way traffic	______________

TRAFFIC

		CURRENT	NEW
28A)	LANES	2	______________
	SPEED	0 mph	______________mph
29)	RECENT ADT	2,755	______________
30)	YEAR	2011	______________
109)	TRUCK %	26%	______________%
114)	FUTURE ADT	4,515	______________
115)	FUT. YEAR	2031	______________

ALTERNATE CLASSIFICATIONS

		CURRENT	NEW
100)	DEFENSE HIGHWAY	2 On Non-Interstate STRA	______________
104)	NAT. HWY. SYSTEM	1 On the NHS	______________
105)	FED. LANDS HWY	0 N/A (NBI)	______________
110)	NAT. TRUCK NETWORK	1 Part of natl network	______________
	SCHOOL BUS RTE	No	[ ]
	TRANSIT RTE	No	[ ]
	EMERGENCY RTE	No	[ ]
	NBI RTE	Yes	[ ]

Figure 40: Roads Subtask

ROAD/ROUTE NAME

This item identifies the name of the route that is associated with Roadway (005A). If the structure just has a “Route on Structure” then the Road/Route Name will mirror Item 7 – Facility Carried. If the structure has a “Route Under” then the Road/Route Name will need to be coded the appropriate name of the route under the structure.

ITEM 005A POSITION/PREFIX

There are two distinct types of records in the SI & A file. The first of these is for "on" records, and the second is for "under" records. This item is used to distinguish between "on" and "under" records. It must be emphasized that all route-oriented data must agree with this coding as to whether the inventory route is "on" or "under" the structure. This field contains the parameters listed below:

Parameters:
Route on Structure
Route Under

"On" means that the inventory route is carried "on" the structure. Each bridge structure carrying highway traffic must have a “Route on Structure” record identified with Item 5A. All of the NBI data items must be coded, with respect to the structure and the inventory route "on" it.

"Under" means that the inventory route goes "under" the structure. If an inventory route beneath the structure is a Federal-aid highway, is a STRAHNET (see the BI-6 Inventory – Roads Subtask section) route or connector, or is otherwise important, a record must be coded to identify it. If only one under route exist, code One Route Under. If multiple under routes exist, begin with 1st Route Under, and continue adding corresponding under records for each additional route. For example, if a structure has 3 under routes, you will need to create 1st Route Under, 2nd Route Under, and 3rd Route Under records.

In most cases, when this item is coded as "under", only the items on the Inventory – Roads Subtask must be entered. However, there are unique situations in which a structure coded as under must have all of the data items coded. These situations are described as follows:

1. When Subfield 43B, under Item 43 - Structure Type, is coded as a tunnel ("18")

2. When Subfield 42A, which describes the type of service "on" the bridge is coded as "2" (railroad), "3" (pedestrian exclusively), or "9" (building plaza).

These examples typify "under" records for structures which do not have an "over" record associated with them.

ITEM 5B—KIND HWY (RT PREFIX)

This item identifies the route signing prefix (administrative class of road) for the inventory route using one of the following parameters:

Code	Description
1	Interstate highway
2	U.S. numbered highway
3	State highway
4	County highway
5	City street
6	Federal lands road
7	State lands road
8	Other *(include toll roads not otherwise indicated or identified above)*

When 2 or more routes are concurrent (on the same roadway), the highest class of route will be used. The hierarchy is in the order listed above. For example, if a single route is signed as both U.S. 82 and Alabama 6, it will be coded "2" because the U.S. numbered highway is higher in the hierarchy than the state highway.

ITEM 005C—DESIGNATED LEVEL SERVICE

This item identifies the designated level of service for the inventory route, using one of the following parameters:

Code	Description
0	None of the below
1	Mainline
2	Alternate
3	Bypass
4	Spur
6	Business
7	Ramp, Wye, Connector, etc.
8	Service and/or unclassified frontage road

ITEM 005D— ROUTE NUMBER

This item identifies the inventory route number. The route number in this field must agree with the route signing prefix coded in subfield 005B.

For "over" records (Item 5A = “Route on Structure”), if concurrent routes are of the same hierarchy level, denoted by the route signing prefix, only the lowest numbered route will be used. For example, where interstates I20 and I59 occupy the same roadbed, "00020" (lowest number) is entered in this subfield. Code "00000" for bridges on roads without route numbers. For "under" records (Item 5A = Route Under”), each route will have its own record.

In Item 005D, do not show the route prefix. For example, for I65 only the numerical "00065" goes in Item 005D. The "I" portion is shown by coding Item 005B “Interstate”. Items 005B and 005D must be in agreement. That is, where Item 005B indicates a U.S. route, Item 005D must contain that U.S. route number (not the state route number).

ITEM 005E—SUFFIX

This item identifies the directional suffix of the inventory route number, when it is part of the route number. This field contains the parameters listed below:

Code	Description
0	Not applicable (usual coding for most routes)
1	North
2	East
3	South
4	West

In some cases, letters may be used with route numbers as part of the route numbers and not to indicate direction. In such cases, the letter should be included in the 5-position route number field.

Examples: The following examples illustrate typical coding of the five subfields, in the Inventory Route Item:

Description	Code				
	5A	5B	5C	5D	5E
U. S. 11, on	1	2	1	00011	0
Interstate 65, on	1	1	1	00065	0
Interstate 10E, under	2	1	1	00010	2
State Highway 104, Spur, under	2	3	4	00104	0
U.S. 31E Bypass, on	1	2	3	00031	2
City street, on	1	5	0	00000	0
Ramp from I-85, under	2	1	7	00085	0
County Highway 173 on	1	4	1	00173	0
Interstate 20 under	2	1	1	00020	0
Interstate 59 on	1	1	1	00059	0
State Hwy 120 (STRAHNET Rt) under	A	3	1	00120	0
Alternate State Hwy 130 under	B	3	2	00130	0
Tunnel on Interstate 10	2	1	1	00010	0

ITEM 006B—CRITICAL FACILITY

This item identifies if the structure is on a critical facility. A structure on a designated STRAHNET or STRAHNET connector highway and considered to be a critical facility is identified by coding this item "* Defense-critical", and a non-critical facility will be coded as "Not Applicable".

ITEM 011—KILIOMETER / MILE POINT

This item identifies the linear referencing system (LRS) milepoint to establish the location of the bridge on the Base Highway Network as identified in Item 012. The milepoint is a 7-digit number which is coded to the nearest thousandth of a mile. The location to be coded is at the beginning of the structure in the direction of increasing milepoints along the LRS Inventory Route identified in Item 13A.

This item must be coded for all structures located on or overpassing the Base Highway Network. For structures carrying the LRS Inventory Route, code the milepoint at the beginning of the structure (i.e. the lowest milepoint on the bridge). When the LRS Inventory Route goes under the structure (Item 5A coded "Route Under"), then code the milepoint on the underpassing route where the structure is first encountered.

Code all zeroes if a milepoint location cannot be determined or is not appropriate. If the beginning of the structure falls at the beginning of a route, the milepoint would normally be zero; however, it is to be coded with the nominal value of 0000.001 instead.

ITEM 012—NATIONAL BASE NET

This item identifies all the structures that are on the National Base Highway network including the through lane (mainline) portions of the NHS, rural/urban principal arterial system and rural minor arterial system. Ramps, frontage roads and other roadways are not included in the National Base Highway Network. In order to determine if the structure is included in the National Base Network, contact an Area office. This field contains the parameters listed below:

Parameters
Not on the Base Network
On Base Network

ITEM 013A—LRS INVENTORY ROUTE

This item identifies the LRS inventory route number of the inventory route identified in Item 5A. If Item 012-National Base Net is to be coded "On Base Network", the information to be recorded for this item is the inventory route for the state's linear referencing system (LRS).

The LRS inventory route numbers to be reported in this item must correspond to the LRS inventory route numbers reported by the state for HPMS.

The LRS inventory route number can be alphanumeric. The LRS inventory route number is not necessarily the same as that posted along the roadway, but is a number used to uniquely identify a route within at least a county and perhaps throughout the state. The last digit of the LRS inventory route is used to record the directional suffix of the inventory route, when it is part of the route number. When a directional suffix is not part of the route number, then the last digit of this subfield should be left blank.

Code	Description
IN	Interstate
AL	Alabama State Route

CO	County Route
MU	Municipal, City Route
NG	National Guard
PF	Park/Forest Route
OS	Other State Route
OF	Other Federal Route

Examples:	Code
Inventory Route I65	000IN0065
Inventory Route AL 75 E	000AL0075E

ITEM 013B—SUB NUMBER

This item identifies the subroute number of the LRS Inventory Route. The subroute number is a number that uniquely identifies portions of an inventory route section where duplicate milepoints occur. These subroute numbers, if they exist, are identified in the State's HPMS-LRS records. If there is no subroute number, code "00" for Item 13B.

ITEM 020—TOLL FACILITY

This item identifies the toll status of the structure. Interstate toll segments under Secretarial Agreement (Title 23 - United States Code - Highways Section 129) are identified separately. This field contains the parameters listed below:

Code	Description
1	Toll bridge. Tolls are paid specifically to use the structure.
2	The bridge carries a toll road. Tolls are paid to use both the highway and the bridge.
3	The bridge is toll-free and carries a toll-free highway. *(This is the usual code for the state of Alabama)*
4	The bridge is part of the Interstate Highway toll segment under Secretarial Agreement. Structure functions as part of the toll segment.
5	The bridge is not part of the Interstate Highway toll segment. It is in a separate toll segment under the Secretarial Agreement.

ITEM 026—FUNCTIONAL CLASS

This item identifies the functional classification of the inventory route identified in Item 5A. To determine the functional classification, consult the Functional Classification maps distributed to inspectors by the Central Office. This map should be reviewed during each inspection since the functional classification of the route may have changed. This field contains the parameters listed below:

Code	Rural	Description
01		Principal Arterial-Interstate (Federal Aid)
02		Principal Arterial-Other (Federal Aid)
06		Minor Arterial (Federal Aid)
07		Major Collector (Federal Aid)

08		Minor Collector (Non Federal Aid)
09		Local (Non Federal Aid)
	Urban	
11		Principal Arterial-Interstate (Federal Aid)
12		Principal Arterial-Freeway or Expressway (Federal Aid)
14		Other Principal Arterial (Federal Aid)
16		Minor Arterial (Federal Aid)
17		Collector (Federal Aid)
19		Local (Non Federal Aid)

The bridge shall be coded rural if not inside a designated urban area. The urban or rural designation shall be determined by the bridge location and not the character of the roadway.

ITEM 102— TRAFFIC DIRECTION

This item identifies the direction of traffic on the inventory route identified in Item 5A. This item must be compatible with other traffic-related items such as Item 28A Lanes, Item 29 - ADT, Item 47 - Horizontal and Item 51 - Roadway. For example, parallel bridges with an open median are coded as follows—if the direction of traffic is 2-way, Item 29 and Item 51 are coded for each bridge separately. This field contains the parameters listed below:

Code	Description
0	Highway traffic not carried
1	1-way traffic
2	2-way traffic
3	One-lane bridge for 2-way traffic

ITEM 028A—LANES

This item identifies the number of "on" lanes (being carried by the structure). This include all lanes carrying highway traffic (i.e., cars, trucks, buses) which are striped or otherwise operated as a full width traffic lane for the entire length of the structure by the owning/maintaining authority. This includes any full width merge lanes and ramp lanes, and is independent of direction of usage (i.e., a 1-lane bridge carrying 2-directional traffic is still considered to carry only one lane on the structure). When the inventory route is "on" the bridge (Item 5A - Roadway is coded “Route on Structure”), the sum of the total number of lanes on all inventoried routes on the bridge is coded. When the inventory route is "under" the bridge, (Item 5A – Roadway is coded “Route Under”) the number of lanes being identified by that record shall be coded.

When the route is “under” the structure, the obstruction over the inventory route may be something other than a highway bridge (railroad, pedestrian, pipeline, etc.). Code "00" for these cases if there are no highway lanes on the obstructing structure.

For example, if the structure has 3 lanes on the bridge and 2 lanes under, code Item 28A – 3 for “Route on Structure” (Item 5A) and code Item 28A – 2 for “Route Under” (Item 5A).

SPEED

This item identifies the posted speed limit at the structure. The speed is entered in miles per hour.

ITEM 029—RECENT ADT

This item identifies the Annual Average Daily Traffic volume for the inventory route identified in Item 5A. The value should be the most recent AADT counts available and should be no more than two years old. The AADT should include trucks, even though trucks are referred to separately in Item 109 – truck %. If the bridge is closed, code the actual AADT before the closure occurred. AADT values for State routes are collected and tabulated by the Transportation Planning Bureau of the Department's Central Office.

The AADT must be compatible with the other items coded for the bridge. For example, parallel bridges with an open median are coded as follows: if Item 028A – Lanes and Item 051 - Roadway are coded for each bridge separately, then the AADT must be coded for each bridge separately (i.e., directional and not the total AADT for the route).

On routes where AADT is not available, the inspector shall develop a reasonable estimate, possibly by observing traffic flow during the bridge inspection.

ITEM 030—YEAR

This item identifies the year that the AADT was calculated in Item 029. Code all 4 digits of the year in this 4-digit field. The year of the AADT should not be more than two years older than the current year.

Example:	Code
Year of AADT is 1995	1995

ITEM 109—TRUCK %

This item identifies the percentage (XX%) of Item 029—AADT that is truck traffic. Do not include vans, pickups or light delivery trucks in this percentage.

If this information is not available, an estimate which represents the average percentage for the category of road carried by the bridge should be used. Leave this item blank if Item 029 (AADT) is not greater than 100.

Examples:	Code
Average Daily Traffic 35% trucks	35
7%	07
12%	12

ITEM 114—FUTURE ADT

This item identifies the forecasted annual average daily traffic (AADT) for the inventory route identified in Item 5A. This will be projected at least 17 years but no more than 22 years from the year that the data is submitted. The intent is to provide a basis for a 20-year forecast. This item may be updated anytime, but must be updated when the forecast falls below the 17-year limit. If planning data is not available, use the best estimate based on site familiarity.

Future AADT estimates for State routes may be obtained from the Transportation Planning Bureau of the Department's Central Office.

The future AADT must be compatible with the other items coded for the bridge. For example, parallel bridges with an open median are coded as follows: if Item 28A (Lanes) and Item 51 (Roadway) are coded for each bridge separately, then the future AADT must be coded for each bridge separately (not the total for the route).

Examples:		Code
Future AADT	4,510	4510
	540	540
	15,600	15600

ITEM 115—FUTURE YEAR

This item identifies the year of the future AADT shown in Item 114. The projected year of future AADT will be at least 17 years but no more than 22 years from the year data is submitted.

Example:		Code
Year of Future AADT is	2034	2034

ITEM 100—DEFENSE HIGHWAY

This item identifies if the inventory route identified in Item 5A is on a STRAHNET highway. For the purposes of this item, the STRAHNET connectors are included in the term STRAHNET. The defense highway designation is shown on the Defense Requirement Section map, distributed by the Central Office (available at Area offices). This field contains the parameters listed below:

Code	Description
0	The inventory route is not a STRAHNET highway.
1	The inventory route is on an Interstate STRAHNET.
2	The inventory route is on a Non-Interstate STRAHNET.
3	The inventory route is a STRAHNET highway that goes over or under another STRAHNET highway.

ITEM 104—NATIONAL HIGHWAY SYSTEM

This item identifies if the inventory route identified in Item 5A is on the Nation Highway System. In order to determine if a structure is on the NHS, contact an Area office. This field contains the parameters listed below:

Code	Description
0	Inventory Route is not on the NHS
1	Inventory Route is on the NHS

ITEM 105—FEDERAL LANDS HIGHWAYS

This item identifies if the inventory route identified in Item 5A is on the Federal Lands Highway Program. Structures owned by State and local jurisdictions on roads which lead to and traverse through federal lands, sometimes require unique identification because they are eligible to receive funding from the Federal Lands Highway Program. This field contains the parameters listed below:

Code	Description
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

ITEM 110—NATIONAL TRUCK NETWORK

This item identifies if the inventory route identified in Item 5A is on the National Truck Network. 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). This network is available for use by commercial motor vehicles of the dimensions and configurations specified in these regulations. To determine if an inventory route is part of the national network for trucks, refer to the Designated Highway System for Truck-Tractor-Semitrailer-Trailer Combinations listing provided by the Central Office. This field contains the parameters listed below:

Code	Description
0	The inventory route is not part of the national network for trucks.
1	The inventory route is part of the national network for trucks.

SCHOOL BUS RTE

This is a check box indicating if the inventory route identified in Item 5A is on a school bus route. If the structure is on a school bus route check the box, but if the structure is not on a school bus route do not check the box.

TRANSIT RTE

This is a check box indicating if the inventory route identified in Item 5A is on a transit route. If the structure is on a transit route check the box, but if the structure is not on a transit route do not check the box.

EMERGENCY RTE

This is a check box indicating if the inventory route identified in Item 5A is on an emergency route. If the structure is on an emergency route check the box, but if the structure is not on an emergency route do not check the box.

NBI RTE

This is a check box indicating if the inventory route identified in Item 5A is on a NBI route. If the structure is on a NBI route check the box, but if the structure is not on a NBI route do not check the box.

Inventory – Roads Subtask (continued)

Structure Inventory and Appraisal

FORM: BI-6		STR. NUM.: OAL0008 240075.014-1	Date: ______________
BIN: 018022	1 REC		Sheet: 5
			Printed: 10/17/2014

Inventory - Roads Subtask

CLEARANCES

	CURRENT	NEW
10) VERTICAL	99.99 ft	______________ft
47) HORIZONTAL	40.00 ft	______________ft

WIDTHS

	CURRENT	NEW
32) APPROACH ROAD	40.00 ft	______________ft
51) ROADWAY	40.00 ft	______________ft

DETOURS

	CURRENT	NEW
19) LENGTH	1.00 mi	______________mi

Figure 41: Roads Subtask Continued

ITEM 010—VERTICAL

This item identifies the minimum vertical clearance of the inventory route identified in Item 5A. The distance is coded by rounding down to the nearest hundredth of a foot. This distance indicates the maximum height of a ten foot wide vehicle that can travel on the paved portion of the inventory route at the location of the structure. In other words, the minimum clearance is for a 10-foot width of pavement or traveled part of the roadway where the clearance is the greatest.

For structures having multiple openings, the clearance for each opening is recorded in the field book or BI-6 form; however, only the greatest of the minimum clearances of the openings is coded regardless of the direction of travel. This would be the practical maximum clearance. When no restriction exists, code "99.99".

Examples:

Min Vert Clearance	Code
15.33 feet	15.33
No restriction	99.99

ITEM 047—HORIZONTAL

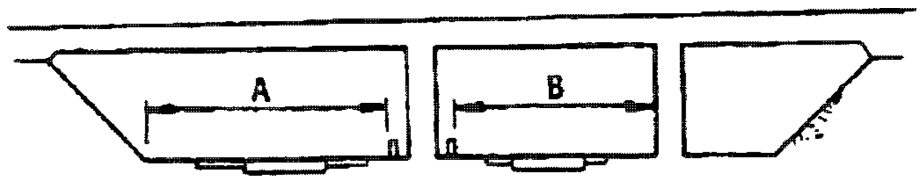
This item identifies the total horizontal clearance of the inventory route identified in Item 5A. The measurement is recorded and coded to the nearest hundredth of a foot. The purpose of this item is to give the largest available clearance for movement of wide loads. When the restriction is 100 feet or greater, this item should be coded "99.99." The following are some examples of total horizontal clearance:

1. The horizontal distance between two restrictive features limiting the inventory route either "on" or "under" the structure. Examples of restrictive features are curbs, rails, walls, piers, abutments, slopes, raised or non-mountable medians, and other structural features limiting the roadway.

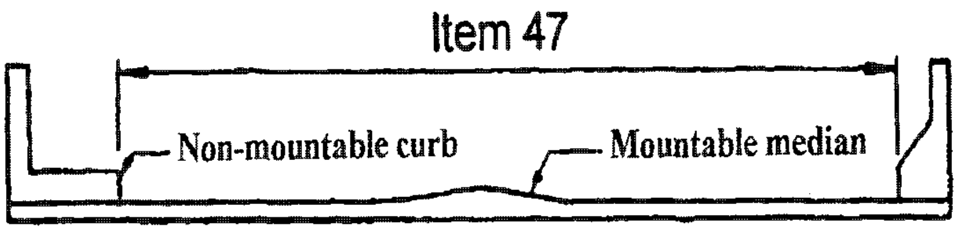
2. In the case of a structure with no restrictions (no median or with a mountable median), the total horizontal clearance is the distance between two restrictive features limiting the roadway.

3. If the median is raised, non-mountable, or an under route divided by piers, then the total horizontal clearance is the greater of the two horizontal clearances measured between two restrictive features in either direction, but not both directions.

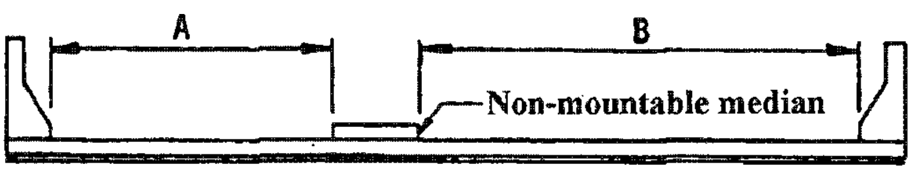
Examples:



Clearance A > B   Item 47 = A



Mountable Median or No Median, Item 47 = A



Raised Median or Non-Mountable Median, B > A, Item 47 = B

Figure 42: Example Inventory Route, Total Horizontal Clearances

ITEM 032—APPROACH ROAD

This item identifies the approach roadway width of the inventory route identified in Item 5A. The measurement is recorded and coded to the nearest tenth of a foot. This width represents the normal width of usable roadway approaching the structure. Usable roadway width includes the width of traffic lanes, plus the widths of shoulders where the 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 being carried. Unstabilized grass or dirt, with no base course, flush with and beside the traffic lane is not considered a shoulder for this item.

For structures with medians of any type and double-decked structures, this item is coded as the sum of the usable roadway widths for the approach roadways (i.e., all median widths which do not qualify as shoulders are not included in this dimension.) When there is a variation between the approaches at either end of the structure, the width of the most restrictive end is coded.

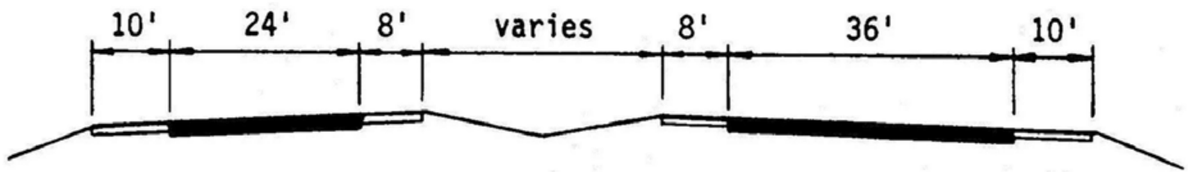


Figure 43: Example for Item 32

Examples:

Left Shoulder	Left Roadway	Median Shoulders	Right Roadway	Right Shoulder	Code
4.0	-	-	16	6	026
6.0	-	-	36	12	054
12.0	48	30	48	12	150
10.0	24	16	36	10	096

The last example above represents the coding method for a structure in which the most restrictive approach has the cross section shown in Figure 43.

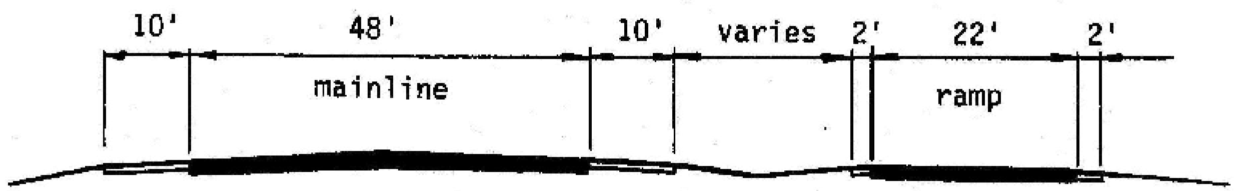


Figure 44: Example for Item 32

Regardless of whether the median is open or closed, the data must be compatible with the other related route and bridge data (i.e., if Item 051 - Roadway is for traffic in one direction only, then Items 028A, 029, 032, etc. must be for traffic in one direction only).

If a ramp is adjacent to the through lanes approaching the structure, it shall be included in the approach roadway width. The total approach roadway width for the example in Figure 44 is 94 feet (a code of "94.0").

ITEM 051—ROADWAY

This field identifies the structures total roadway width of the inventory route identified in Item 5A. The width measured is the sum of the widths of all lanes and shoulders carried by the structure (regardless of direction of traffic), but should not include raised or non-mountable medians, open medians, barrier widths, and barrier protected bicycle and equestrian lanes. The width recorded should be the most restrictive minimum distance. 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 measurement is recorded and coded to the nearest tenth of a foot

Where the roadway is on earth fill carried across a structure and the headwalls or parapets do not affect the flow of traffic, code "0". This is considered proper since as a filled section simply maintains the roadway cross-section. However, for sidehill viaduct structures, code the actual full curb to curb roadway width (see figure 45A).

Where traffic runs directly on the top slab (or wearing surface of a culvert-type structure, e.g., box culvert without fill), code the actual roadway width (curb-to-curb or rail-to-rail). This will also apply where the fill is minimal and headwalls or parapets affect the flow of traffic. The data recorded for this item must be compatible with other related route and bridge data (i.e., Items 28A, 29, 32, etc.). See Figures 43, 44 and 45 for examples.

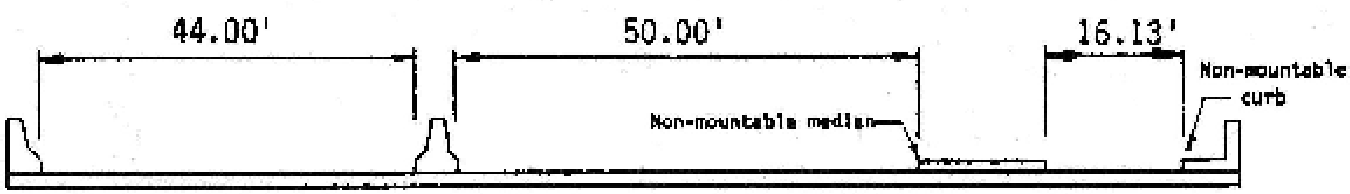
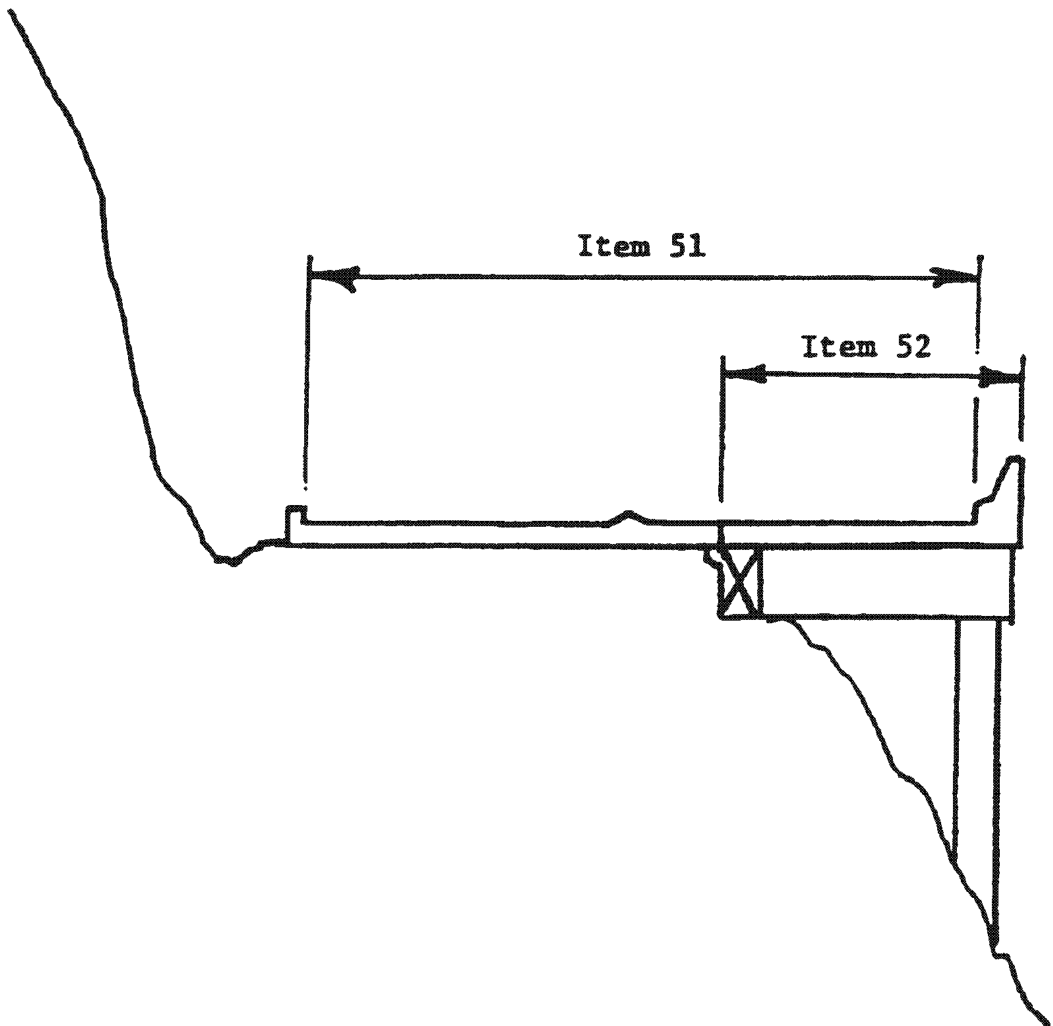


Figure 45: Example for Item 51

FIGURE ILLUSTRATING CODING OF SIDEHILL VIADUCTS



Associated Items:

Item 28A - Lanes On Structure
Item 29 - ADT = Total for entire structure
Item 32 - Approach Roadway Width
Item 102 - Direction of Traffic = 2 for 2-way

Figure 46: Example for Items 51 and 52

Examples:

Bridge Roadway Width	Code
16.00 feet	16
21.43 feet	21.430
789.22 feet	789.220
110.13feet	110.130

ITEM 019—LENGTH

This item identifies the detour length in miles for this structure. The detour length should represent the total additional travel for a vehicle which results from the closing of a bridge.

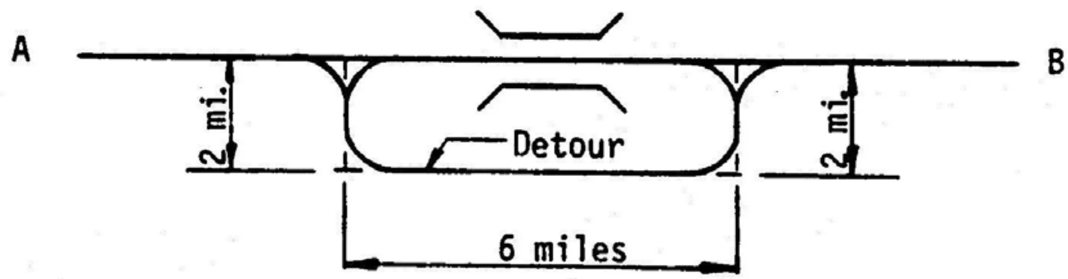
If a ground level bypass is available at the structure site for the inventory route, code the detour length as "000." If the bridge is one of twin bridges and is not at an interchange, code "001" where the other twin bridge can be used as a temporary bypass with a reasonable amount of crossover grading. In other cases, indicate the actual length of the detour route to the nearest mile. Code "199" for 199 miles or more.

One factor to consider when determining if a bypass is available at the site is the potential for moving vehicles, including military vehicles, around the structure. This is particularly true when the structure is in an interchange. For instance, a bypass would probably be available in the case of diamond interchanges, interchanges where there are service roads available, or other interchanges where the positioning and layout of ramps are such that they could be used without difficulty to get around the structure.

The detour route will be established following allowable criteria determined by the governing authority. (Some authorities will not allow a designated detour over a road or bridge of lesser "quality.")

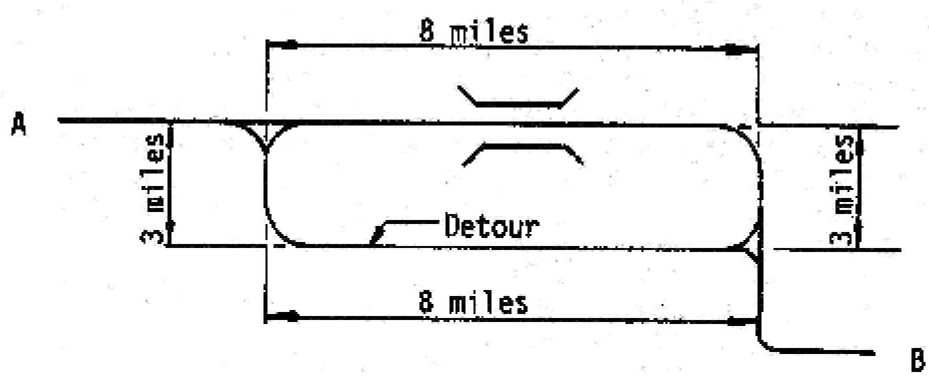
Several examples are presented to illustrate the manner in which detour distances are calculated and coded. Following that, Figures 47 and 48 provide a graphic representation of detour distance calculations.

Examples:	Code
Two lane road, 6-mile detour	6
Two lane road, 4-mile detour (see Figure 47)	4
Two lane road, alternate route available at same net length *(see Figure 48)*	000
Diamond interchange, structure bypassable	000
Diamond interchange, structure bypass	4
Structure over river; 121-mile detour	121
Structure over highway, no interchange, bypassable at ground level	000
Structure on dead end road	199
Four lane divided highway with parallel bridge available	1



Bypass, Detour Length A To B = 4 Miles

Figure 47: Example for 19 - Detour Length



Bypass, Detour Length A to B = 0 Miles

Figure 48: Example for Item 19 - Detour Length

Inventory – Identification Subtask

Structure Inventory and Appraisal
FORM: BI-6 STR. NUM.: OAL0008 240075.014-1
BIN: 018022 1 REC
Date: ______________
Sheet: 6
Printed: 10/17/2014

Inventory - Identification Subtask

AGENCY IDENTIFICATION

		CURRENT	NEW
201)	LOCAL IDENTRIFIER	NNNN	
215)	PREVIOUS STRUCTURE BIN(s)	1037	
298)	REPLACEMENT BIN	0	
214)	ADJACENT MAINLINE BIN	12757	
205)	RELATIVE POSITION INDICATOR	-1	
203)	MPO CODE	Not in an MPO	
206)	CONGRESSIONAL DISTRICT	07	
207)	SENATE DISTRICT	23	
208)	HOUSE DISTRICT	067	
297)	LOCAL COMMISSION DISTRICT	00	
294)	BRIDGE NAME / DESIGNATOR		
210)	CPMS REFERENCE NUMBER	100002894	
292)	PROJECT NUMBER	BRF-0008(513)	
	ALABAMA ID	OAL0008 240075.014-1	
	ALDOT REGION		

INSPECTION

		CURRENT	NEW
293)	INSPECTION AGENCY	State Highway Agency	
	SPECIAL INSPECTION COUNT	0	
92D)	SPECIAL INSPECTION TYPE		
92D)	SPECIAL INSPECTION TYPE		
92D)	SPECIAL INSPECTION TYPE		
92D)	SPECIAL INSPECTION TYPE		
	SPECIAL EQUIPMENT COUNT	0	
222)	SPECIAL EQUIPMENT USED		
222)	SPECIAL EQUIPMENT USED		
222)	SPECIAL EQUIPMENT USED		
222)	SPECIAL EQUIPMENT USED		
222)	SPECIAL EQUIPMENT USED		
222)	SPECIAL EQUIPMENT USED		
222)	SPECIAL EQUIPMENT USED		
218)	TOTAL EMP-HRS FOR UNDERWATER INSP	0	
219A)	SNOOPER INSP REQUIRED	Snooper Insp. Not Req'd	
219B)	SNOOPER INSP FREQUENCY	0	
220)	LAST SNOOPER INSPECTION DATE	01/01/1900	/ /
224A)	SCOUR INSPECTION REQUIRED	Scour Monit. Req'd	
224B)	SCOUR INSPECTION FREQUENCY	24 mo	mo
224C)	SPECIAL INSPECTION DETAIL INDICATOR	Snooper Insp. Not Req'd	
225A)	SCOUR COUNTERMEASURES REQUIRED	Scour Counterm Not Req'd	
225B)	SCOUR COUNTERMEASURES PLANNED	01/01/1900	/ /
225C)	SCOUR COUNTERMEASURES COMPLETED	01/01/1900	/ /
113)	SCOUR CRITICAL	8 Stable Above Footing	
113B)	SCOUR CRITICAL BRIDGE DESCRIPTION	Eval by Asses-Cal Pend.	
	FOUNDATION TYPE	Pile	
	FOUNDATION ELEVATION	Known	
	STREAMBED MATERIAL	Clay/Loam	

Figure 49: Identification Subtask

ITEM 201—LOCAL IDENTIFIER

This item is a 4-digit field that can be used for non-state owned bridges. For these structures some local government agencies may want to use and assign its own structure numbering scheme to the structures under its jurisdiction. This item should be coded “NNNN” for state owned bridges.

ITEM 215—PREVIOUS STRUCTURE BIN(S)

This item identifies the previous bridge’s Bridge Identification Number (BIN). When an existing bridge(s) is torn down and replaced, the new bridge is assigned a new BIN. The previous structure(s) BIN is the inventory number for the old bridge(s) that was replaced. If the structure has never been replaced, code this item with all zeroes. Note that the Alabama ID may be the same for both the new and old structures, but they will each have a unique BIN.

ITEM 298—REPLACEMENT BIN

This item identifies the replacement bridge’s Bridge Identification Number (BIN). When a bridge(s) is going to be replaced it is assigned a new BIN. The replacement structure(s) BIN is the inventory number for the new bridge(s) that will be built. If the structure is not currently in the process of being replaced, code this item with all zeroes. Note that the Alabama ID may be the same for both the old and new structures, but they will each have a unique BIN.

ITEM 214—ADJACENT MAINLINE BIN

This item identifies the Bridge Identification Number (BIN) if the structure has an adjacent structure. On the Interstate system or on other divided highways, there are usually twin, parallel or adjacent bridges to carry traffic in opposite directions of travel. For any location where this occurs, record the adjacent structure’s BIN in this field. If there is no adjacent mainline BIN code this item with all zeroes.

ITEM 205—RELATIVE POSITION INDICATOR

This item identifies a structure's relative position to other structures which may overlap any particular milepoint on the inventory route. This condition may occur at parallel structures, ramps, service road structures or any combination of the above. Any single structure is to be coded "00." Parallel structures by themselves are to be coded as "-1" for the leftmost structure in the direction of the inventory route, and "1" for the rightmost. Where service road and ramp structures are present, the same numbering scheme (i.e. -3, -2, -1, 0, 1, 2, 3) for the left and rightmost structure is to be used.

ITEM 203—MPO CODE

This item identifies if a bridge is located in a MPO (Metropolitan Planning Organization) jurisdiction. Contact the preconstruction engineer in the area office in which the structure is located to determine if it is within a MPO jurisdiction. If the bridge is not in a MPO jurisdiction, code "Not in an MPO." This field contains the parameters listed below:

Parameters
Not in an MPO
Auburn-Opelika Area
Birmingham Area
Calhoun Area
Columbus-Phenix City Area
Decatur Area
Dothan Area
Etowah Area
Huntsville Area
Mobile Area
Montgomery Area
Shoals Area
Tuscaloosa Area

ITEM 206—CONGRESSIONAL DISTRICT

This item identifies the U. S. Congressional District in which the bridge is located. If the bridge crosses a boundary between two congressional districts, record the number of the district to the south or to the west of the bridge.

For bridges on state routes, information on the correct district number may be obtained from the Transportation Planning Bureau in the Central Office. For local government bridges, information on the district number may be found in the voting registration office of the county courthouse. Valid codes for this item are "01" through "07."

ITEM 207—SENATE DISTRICT

This item identifies the Alabama Senate District in which the bridge is located. If the bridge crosses a boundary between two districts, record the number of the district to the south or to the west of the structure.

For bridges on state routes, information on the correct district number may be obtained from the Transportation Planning Bureau in the Central Office. For local government bridges, information on the district number may be found in the voting registration office of the county courthouse. Valid codes for this item are "01" through "35."

ITEM 208—HOUSE DISTRICT

This item identifies the Alabama House of Representatives District in which the bridge is located. If the bridge crosses a boundary between two districts, record the number of the district to the south or to the west of the structure.

For bridges on states routes, information on the correct district number may be obtained from the Transportation Planning Bureau in the Central Office. For local government bridges, information on the district number may be found in the voting registration office of the county courthouse. Valid codes for this item are "001" through "105."

ITEM 297—LOCAL COMMISSION DISTRICT

This item identifies the Local Commission District in which the bridge is located. If the bridge crosses a boundary between two districts, this item has two fields to capture both districts. For the majority of structures with a local commission district, they will only be in one district; therefore, code the local commission district in the first field and code the second field “00”.

ITEM 294 — BRIDGE NAME/DESIGNATOR

This item identifies if the bridge name assigned to it was formally by governmental resolution or locally developed. If the bridge was named by a governmental resolution code this field “A”, but if the bridge name was locally developed code this field “B”. If the structure does not have a name, leave this field blank.

ITEM 210—CPMS REFERENCE NUMBER

This item identifies the ALDOT CPMS (Comprehensive Project Management System) reference number from the original construction of the structure. If there have been subsequent projects performed on this bridge since its original construction, then reference numbers for the subsequent projects may be entered on the Bridge Notes Task (BI-13).

Examples:

	Code
CPMS reference number	100032812

ITEM 292— PROJECT NUMBER

This item identifies the Federal Aid Project Number.

Examples:

	Code
Project number	BRZ – 5400 (16)

ALABAMA ID

This item identifies the Alabama ID. The Alabama ID was formerly known as the structure number in ABIMS. This item is made up of multiple items. For state structures the Alabama ID is made up of the Bridge Status, Item 13A – LRS Inventory Route, Item 3 – County, Item 11 – Mile Point, and Item 101 – Parallel Structure. For structures owned by a local agency, the Alabama ID is made up of the Bridge Status, Item 13A – LRS Inventory Route, Item 3 – County, Item 201 local Identifier, and Item 101 – Parallel Structure.

ALDOT REGION

This item identifies the Department Region in which the bridge is located. A map indicating the Region boundaries may be found in Appendix A of this manual.

When the bridge falls at the boundary between two regions, it is identified as being in (and assigned to) the region to the west or south of the boundary. This method of assigning a bridge to a region is used unless a written agreement between the two regions is on file in the bridge folder.

ITEM 293—INSPECTION AGENCY

This item identifies the agency that has inspection responsibility for the structure If more than one agency has equal inspection responsibility for the structure, select the agency highest in the hierarchy of State, Federal, county, city, railroad, and private. This field contains the parameters listed below:

Code	Description
01	State Highway Agency
02	County Highway Agency
03	Town or Township Highway Agency
04	City or Municipal Highway Agency
11	State Park, Forest, or Reservation Agency
12	Local Park, Forest, or Reservation Agency
21	Other State Agencies
25	Other Local Agencies
26	Private (other than railroad)
27	Railroad
31	State Toll Authority
32	Local Toll Authority
60	Other Federal Agencies (not listed below)
61	Indian Tribal Government
62	Bureau of Indian Affairs
63	Bureau of Fish and Wildlife
64	U.S. Forest Service
66	National Park Service
67	Tennessee Valley Authority
68	Bureau of Land Management
69	Bureau of Reclamation
70	Corps of Engineers (Civil)
71	Corps of Engineers (Military)
72	Air Force
73	Navy/Marines
74	Army
75	NASA
76	Metropolitan Washington Airports Service
80	Unknown

SPECIAL INSPECTION COUNT

This item identifies the number of Special (Interim) Inspection Types required for the structure. The types of Special Inspections can be found on Item 92D – Special Inspection Type. Up to 4 types can be identified. If no Special (Interim) Inspections are required code this item as N/A.

ITEM 92D—SPECIAL INSPECTION TYPE

This item identifies the types of Special (Interim) Inspections the structure might have. Each Special Inspection Type must be captured in this field. This field contains the parameters listed below:

<u>Parameters:</u>
Segmental concrete
Cable stayed
Suspension and movable bridges
Pin and hanger details
Temporarily supported bridges
Bridges with fatigue cracking
Scour problems
Bridges damaged by vehicular or vessel impact or accident
Concrete bridges showing signs of distress for which plans are not available
Long span metal culverts and structural plate culverts
Interim inspections of bridges posted at operating rating
Interim inspection on bridges with condition grade of 4 or less

SPECIAL EQUIPMENT COUNT

This item identifies the number of special equipment used during the structure's inspection. The types of special equipment can be found on Item 222 – Special Equipment Used. Up to 7 types of special equipment can be identified. If no special equipment is required, code this item "N/A".

ITEM 222—SPECIAL EQUIPMENT USED

This item identifies the types of special equipment used during the structure's inspection. All special equipment used during the inspection must be captured in this field. This field contains the parameters listed below:

<u>Equipment</u>
Snooper
All-terrain vehicle
Special ladder
Aerial bucket
Boat
Safety belt, line, etc.
Traffic Control
Catwalk

ITEM 218—TOTAL EMP-HOURS FOR UNDERWATER INSPECTION

This item identifies the total hours spent at the bridge site by the diving crew. This entry covers all parts of the inspection including setup, diving and other associated activities, but does not include travel time. Time spent by all members of the diving crew are counted. For example, if a crew of four takes a full eight hour day at the bridge site to perform the underwater inspection, then 32 hours are entered for this item. The value is rounded up to the nearest whole number. If underwater inspection is not required, or has not yet been performed, code this item "0."

ITEM 219A—SNOOPER INSPECTION REQUIRED

This item identifies whether a special vehicle is required to allow the inspector to examine inaccessible portions of the bridge. The snooper vehicle uses a bucket mounted at the end of an extension arm. It is normally used to view areas like the underside of extremely high structures which cannot be reached with a ladder.

This item must be coded for all structures. If the structure requires a snooper inspection, then code this item “Snooper Insp. Required”. If a snooper inspection is not required then code this item “Snooper Insp. Not Req’d”.

ITEM 219B—SNOOPER INSPECTION FREQUENCY

This item identifies the frequency in which inspections requiring a special vehicle are made. If a snooper inspection is required, enter the frequency of the snooper inspection in months. If snooper inspection is not required, enter "00".

ITEM 220—LAST SNOOPER INSPECTION DATE

This item identifies the date of the last snooper inspection. If a snooper inspection is not required, leave the date as 1/1/1900.

ITEM 224A—SCOUR INSPECTION REQUIRED

This item identifies if a Scour Inspection is required for the structure. If the structure is required to be monitored for scour then code this item "Scour Monit. Req’d". If the structure does not require scour monitoring then code this item "Scour Monit. Not Req’d".

ITEM 224B—SCOUR INSPECTION FREQUENCY

This item identifies the frequency of the scour inspection. If scour monitoring is required, the frequency in months is coded in this field. If scour monitoring is not required, then code this field "00".

ITEM 224C—SPECIAL INSPECTION DETAIL INDICATOR

This item identifies the presence of details which require special scour monitoring. If no special details are required for scour monitoring, then this item will be coded "No Special Details". If special details are required for scour monitoring, then this item will be coded "Sp Dets req’d for Sc Mon". The special details will be given on the Bridge Notes Task and/or the Scour Plan of Action.

ITEM 225A—SCOUR COUNTERMEASURES REQUIRED

This item identifies if the structure requires scour countermeasures. If the structure requires scour countermeasures, then code this field “Scour Counterm Req’d". If scour countermeasures are not required, then code this field “Scour Counterm Not Req’d".

ITEM 225B—SCOUR COUNTERMEASURES PLANNED

If the structure requires scour countermeasures, this item identifies the date for the planned countermeasures. If countermeasures are not required or have not been planned, then code this field as 1/1/1900.

ITEM 225C—SCOUR COUNTERMEASURES COMPLETED

If scour countermeasures have been performed on this structure, then this item identifies the date the work was completed. Note that Item 225C will only be coded upon receipt of written notification from the Area, County or City of completion of planned countermeasures. If countermeasures are not required or have not been completed, then code this field as 1/1/1900.

ITEM 113—SCOUR CRITICAL

This item identifies the degree to which the bridge is vulnerable to scour. To determine a bridge’s current scour status, bridges are analyzed by hydraulic/ geotechnical/ structural engineers. Details on conducting a scour analysis are included in the FHWA Technical Advisory 5140.23 entitled, "Evaluating Scour at Bridges." Whenever a rating of " 2" or below is determined for this item, the rating for Item 60—Substructure and other affected items (i.e., load ratings , superstructure ratings) should be revised to be consistent with the severity of observed scour and resultant damage to the bridge. A plan of action should be developed for each scour critical bridge. A scour critical bridge is one with abutment or pier foundations rated as unsafe due to (1) observed scour at the bridge site or **(2)** a scour potential as determined from a scour evaluation study. This field contains the parameters listed below:

Code	Description
N	Not Over Waterway. The bridge is not over a waterway, therefore is not subject to scour.
U	Unknown Scour. 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 and immediately after flood events.
T	Tidal, Low Risk. 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 until an evaluation is performed ("Unknown" foundations in tidal waters should be coded U.)
9	On Dry Land. Bridge foundations (including piles) well above flood water elevations.
8	Stable Above Footing. Bridge foundations determined to be stable for the assessed or calculated scour condition. Scour is determined to be above the top of

the footing (Example A) by assessment, by calculations or by installation of properly designed countermeasures.

7 Countermeasures. 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 Calcs not made. Scour calculation / evaluation have not been made. (Use only to describe cases where bridges have not been evaluated for scour potential).

5 Stable w/in footing. Foundations determined to be stable for assessed or calculated scour condition. Scour is determined to be within limits of footing or piles (Example B) by assessment, by calculations or by installation of properly designed countermeasures.

4 Stable, needs action. Foundations determined to be stable for assessed or calculated scour conditions; field review indicates action is required to protect exposed foundations.

3 SC - Unstable. Structure is scour critical; foundations determined to be unstable for assessed or calculated scour conditions:

- Scour within limits of footing or piles. (Example B)
- Scour below spread-footing base or pile tips. (Example C)

2 SC - Extensive Scour. Structure is scour critical; field review indicates that extensive scour has occurred at bridge foundations; which are determined to 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 Item 60.

1 SC - Fail Imminent. Structure is scour critical; field review indicates that failure of piers and/or abutments is imminent; bridge is closed to traffic. Failure is imminent based on:

- 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 Item 60.

0 SC - Bridge Failed. Structure is scour critical; bridge has failed and is closed to traffic.

ITEM 113B – SCOUR CRITICAL BRIDGE DESCRIPTION

This item identifies the description for scour critical bridges. If Item 113-Scour Critical is coded "N", "U", "T", "9", or "6", then this field should be coded as "Culvert Not Evaluated." Otherwise, if Item

113- Scour Critical is coded as "0", "1", "2", "3", "4", "5", "7", or "8" then this field should be coded using one of the parameters below:

Code	Description
Eval by Asses-Cal Pend.	Evaluations made by assessment. Calculations are pending.
Culvert Evaluated	Structure is a bridge culvert which has been evaluated.
Eval Based on Scour Cal	Evaluations made based on scour calculations.
Culv not Assess-Low Risk	Structure is a bridge culvert which has not been assessed but is being reported as low risk as per FHWA directives.
Str-Soild Rock-Assm Stab.	Used only with 8-Stable Above Footing. This code indicates that the structure is founded on solid rock. Structure is assumed stable; calculations will not accurately reflect stability.

In Alabama, the appropriate code will be entered by the ALDOT Maintenance Bureau for all bridges in the database.

FOUNDATION TYPE

This item identifies the type of foundation for the structure and it’s susceptibility to scour and erosion. If there is more than one type of foundation for the structure, the most prevalent foundation type shall be used. If the foundation type is unknown or if the inspector is uncertain of the foundation type, there is a greater cause for concern. This field contains the parameters listed below:

Parameters:
Pile
Rock
Spread
Unknown foundation type

FOUNDATION ELEVATION

This item identifies if the structure’s foundations have known elevations. This item is not dependent on the type of foundation present. If the foundation elevations are unknown, there is a greater cause for concern. This field contains the parameters listed below:

Parameters:
Known foundation elevations
Unknown foundation elevations

STREAMBED MATERIAL

This item identifies the type of material in the streambed at the structure. This field contains the parameters listed below:

Parameters:
Bedrock
Rock
Shale
Gravel
Sand or Clay
Clay or Loam
Muck or Unknown

Inventory – Identification Subtask (continued)

Structure Inventory and Appraisal

FORM: BI-6 | STR. NUM.: OAL0008 240075.014-1 | Date: ______________

BIN: 018022 | 1 REC | Sheet: 7

Printed: 10/17/2014

Inventory - Identification Subtask

AGENCY LOAD RATING

		CURRENT	NEW
41)	STRUCTURE TRAFFIC STATUS	A Open, no restriction	________
70)	POSTING	5 At/Above Legal Loads	________
63)	OPERATING RATING TYPE	1 LF Load Factor	________
64)	OPERATING RATING	83.17	________ton
65)	INVENTORY RATING TYPE	1 LF Load Factor	________
66)	INVENTORY RATING	49.80	________ton
249)	RATING SPECIFICATION USED	LFD	________
250A)	RATING ANALYSIS PERFORMED MAJOR	AASHTO BrR (Virtis)	________
		Not Rated / Analyzed	________
251)	RATING AGENCY	ALDOT (Maint. Bureau)	________
252)	DATE RATED	11/01/2007	xxxxxxxx
253)	RATING STATUS	Rating Published	________
		No Action	________
		No Action	________
254A)	LOAD TYPE H	57.32	________ton
254B)	LOAD TYPE TWO-AXLE	73.96	________ton
254C)	LOAD TYPE TRI-AXLE DUMP	74.36	________ton
254D)	LOAD TYPE CONCRETE TRUCK	67.14	________ton
254E)	LOAD TYPE 18 WHEELER	98.21	________ton
254F)	LOAD TYPE SIX-AXLE	98.21	________ton
254G)	LOAD TYPE SCHOOL BUS	63.53	________ton
257)	REASON POSTED	Superstructure	________
		None / Condition Noted	________
258A	LAST POST CHANGE REASON	Never Posted	________
258B	LAST POST CHANGE DATE	01/01/1900	____/____/____
259)	POSTING CHART INDICATOR	Leave Off Posting Chart	________
261)	DATE OF TEMPORARY STRENGTHENING	01/01/1900	____/____/____
262)	TYPE OF TEMPORARY STRENGTHENING		________
			________
265)	STANDARD DRAWINGS MAIN SPAN	00000000000000000	________
266)	STANDARD DRAWING SPPROACH SPAN	NNNNNNNNNNNNNNNNN	________
31)	LIVE LOAD	5 MS 18 (HS 20)	________

Figure 50: Identification Subtask Continued

ITEM 41—STRUCTURE TRAFFIC STATUS

This item provides information about the operational status of a structure. This field contains the parameters listed below:

Code	Description
A	Open, no restriction
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	Bridge closed to all traffic.
P	Posted for load (may include other restrictions such as temporary bridges which are load posted).
R	Posted for other load-capacity restrictions (speed, number of vehicles on bridge, etc.)

The field review could show that a structure is posted, but Item 70 - Bridge Posting may indicate that posting is not required. The apparent contradiction can be resolved and understood if one considers the fact that Item 70 is based on the operating stress level, but Item 41 reflects the governing agency's posting procedures which may specify posting at some stress level less than the operating rating.

ITEM 70—POSTING

This item identifies if posting is required and to what extent. The National Bridge Inspection Standards require posting of load limits only if the maximum legal load in the State produces stresses in excess of the operating stress level permitted under the operating rating.

The codes "0" through "5" are used to indicate the percentage difference between the maximum legal load and the operating rating capacity. This field contains the parameters listed below:

Code	Relationship of Operating Rating to Maximum Legal Load
5	Equal to or above maximum legal load (Posting not required)
4	0.1 to 9.9% below maximum legal load (Posting required)
3	10.0 to 19.9% below maximum legal load (Posting required)
2	20.0 to 29.9% below maximum legal load (Posting required)
1	30.0 to 39.9% below maximum legal load (Posting required)
0	More than 39.9% below maximum legal load (Posting required)

This item evaluates the load capacity of a bridge in comparison to the state legal load. It differs from Item 67 - Structural Evaluation in that Item 67 uses Item 66 - Inventory Rating, while the bridge posting requirement is based on Item 64 - Operating Rating.

Although posting a bridge for load-carrying capacity is required only if the maximum legal load exceeds the operating rating capacity, highway agencies may choose to post at less than the operating rating capacity. There may be instances when Item 70 is coded to show that no posting is required, yet the State or local government has decided to post at less than the operating rating. Thus, Item 41 (Structure Traffic Status) and Item 70 will appear to be in conflict. This coding practice is correct and acceptable, because the two items have different purposes and criteria. Item 70 shall be coded "4" or less only if the legal load of the state exceeds that permitted under the operating rating.

Posting a temporary bridge for load-carrying capacity requires special consideration. The load-carrying capacity of the temporary bridge reflects its actual capacity at the operating rating. However, the highway agency may choose to post at a lower level. This also applies to bridges with temporary repairs or shoring.

ITEM 63—OPERATING RATING TYPE

This item identifies which load rating method was used to determine the operating rating coded in Item 64 for this structure. This item is entered in by the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau.

Code	Description
0	Field evaluation and documents
1	Load Factor Design (LFD)
2	Allowable Stress Design (ASD)
3	Load and Resistance Factor Design (LRFD)
4	Load Testing
5	No rating analysis performed
6	Load Factor (MS18)
7	Allowable Stress (MS18)
8	LRFR (HL93)

A code of "0" should be used whenever the operating and inventory ratings are assigned (i.e., assigning values based on HS design level, visual inspections, etc.) instead of computed.

ITEM 64—OPERATING RATING

This item identifies the operating rating, also known as capacity rating, refers to the maximum permissible loading to which the structure may be subjected for the vehicle type specified in the rating. This item is entered by the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau.

It should be emphasized that only HS loading shall be used to determine the operating rating.

Example:

Description	Code
HS 20 vehicle which has a weight of 36 tons	36.0
HS 15 vehicle which has a weight of 27 tons	27.0

The *AASHTO Manual for Bridge Evaluation* provides a choice of load rating methods, such as the load and resistance factor design (LRFD) rating method, in addition to the allowable stress design (ASD) and load factor design (LFD) methods. Refer to Appendix I for more details about load rating.

If the bridge will not carry a minimum of 3 tons of live load, the operating rating shall be coded "00.0"; and consistent with the direction of the AASHTO Manual, it shall be closed.

Temporary bridges require special consideration in coding. In such cases, since there is no permanent bridge, Items 64 and 66 should be coded as "00.0" even though the temporary bridge is rated for as much as the full legal load. A bridge shored up or repaired on a temporary basis is considered a temporary bridge and the inventory and operating ratings are coded as if the temporary shoring were not in place. See Item 103 - Temporary Structure Designation for definition of a temporary bridge.

Code "99.9" for a structure under sufficient fill such that (according to AASHTO design) the live load is insignificant in the structure load capacity.

Examples:

Description	Code
HS20	48.0
Temporary bridge	00.0
Shored-up bridge	03.0*
Structure under fill (not affected by live load)	99.9

* load capacity without shoring

ITEM 65—INVENTORY TYPE

This item identifies which load rating method was used to determine the Inventory Rating coded in Item 66 for this structure. This item is entered in by the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau.

Code	Description
0	Field evaluation and documents
1	Load Factor Design (LFD)
2	Allowable Stress Design (ASD)
3	Load and Resistance Factor Design (LRFD)
4	Load Testing
5	No rating analysis performed
6	Load Factor (MS18)
7	Allowable Stress (MS18)
8	LRFR (HL93)

A code of "0" should be used whenever the operating and inventory ratings are assigned (i.e., assigning values based on HS design level, visual inspections, etc.) instead of computed.

ITEM 66—INVENTORY RATING

The inventory rating refers to the loading which can be safely applied to an existing bridge for an indefinite period of time. This rating is normally less than the corresponding operating rating. Only the HS loading will be used to determine the inventory rating. This item is entered by the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau.

Code "99.9" for a structure under sufficient fill such that (according to AASHTO design) the live load is insignificant in the structure load capacity.

ITEM 249—RATING SPECIFICATION USED

This item identifies the specifications used to determine the rating for posting vehicles. This specification may be different from the one recorded for Items 63 – Operating Rating Type and Item 65 – Inventory Rating Type. Load testing will not be included in this subfield since it is an analysis method and not a specification. This field contains the parameters listed below:

Parameters:

LFD - Load Factor Design

ASD - Working Stress (Allowable Stress) Design

RFD - Load and Resistance Factor Design

Autostress Design

PE Inspection

Rated but Unknown

Not Rated

Other

ITEM 250A—RATING ANALYSIS PERFORMED MAJOR

This item is composed of two text subfields to describe the analysis tool which is used to rate each bridge. This item will be coded only by personnel in the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau. The first subfield describes the predominant (major) analysis procedure used for the structure (i.e., main spans, etc.) The second field shows the secondary (minor) analysis procedure used for the structure (i.e., approach spans, span with no information, etc.). This field contains the parameters listed below:

Parameters:

Live Load Negligible (for culverts)

PE Inspection

Hand Calculations

Load Test

AASHTO BARS

AASHTO BrR (Virtis)

BRASS Culvert

BRUFEM

Merlin DASH

Not Rated/Analyzed

Other

ITEM 251—RATING AGENCY

This item identifies who performed the rating. This item will be coded only by personnel in the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau. When counties or municipalities rate their own bridges, they are to notify the Bridge Rating and Load Testing office who will code this item as required. This field contains the parameters listed below:

Parameters:

ALDOT (Maintenance Bureau)

ALDOT (Bridge Bureau)

Bridge Owner (Not ALDOT)

Consultant

Not Rated/Analyzed

ITEM 252—DATE RATED

This item identifies the date when the last rating of the structure occurred. This item will be coded only by personnel in the Bridge Rating ad Load Testing Section of the ALDOT Maintenance Bureau.

The term "last rating" means the rating which produced the values that are coded in Item 254. If the bridge has never been rated the date will be coded as 1/1/1900.

ITEM 253—RATING STATUS

This item identifies the rating status of the structure. This item will be coded only by personnel of the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau.

Subfield	Description
253A	Rating Published
253B	Primary Rating Status
253C	Secondary Rating Status

Subfield 253A - Rating Published: "Published" means that the rating results have been made officially known to the owning agency and/or the public at large. This field contains the parameters listed below:

Parameters:

Rating published

Rating not published

Subfield 253B - Primary Rating Status: This subfield is used to indicate any pending action involving the rating status. The primary rating status is that which best describes the predominate current stage of rating that a structure has reached. This field contains the parameters listed below:

Parameters:

Need Information

Received Information

Need More Information

Issues with Information

Clarify Information

Concrete – PE Inspection

No PE Inspection Allowed

Not Legal – Measure

Not Legal – Measure-High

Need Concrete Cores

Requested Concrete Cores

No Bridge Card

Rate with Std. Dwgs.

Rate with Plans

"Advanced" Analysis

Load Test Candidate

No Action

Subfield 253C - Secondary Rating Status: This subfield is used to describe the secondary rating status. The secondary rating status is that which best describes the rating status not covered by subfield 253B. The same parameters are used for this subfield as the parameters in subfield 253B.

ITEM 254(A – G)—LOAD LIMITS

These items capture the load limit in tons which may be carried by a bridge. They are to be coded only by personnel of the Bridge Rating and Load Testing Section of the ALDOT Maintenance Bureau. The load limits are expressed as seven subfields, corresponding to the types of vehicles shown on load limit signs, as follows:

Subfield

254A Load Type H

254B Load Type Two-Axle

254C Load Type Tri-Axle Dump

254D Load Type Concrete Truck

254E Load Type 18 Wheeler

254F Load Type Six-Axle

254G Load Type School Bus

These load limits are the actual values as determined by the rating process. They may exceed the legal limit for one or more vehicles. It is important to understand that even if a bridge rates higher than the legal limit for a particular vehicle, that vehicle must still not exceed its allowable weight as set by state and local law.

ITEM 257—REASON POSTED

This item is composed of two subfields. If a bridge is posted, this item is used to code the reason why. The first subfield identifies the bridge element or combination of bridge elements that control the bridge posting. The second subfield describes the condition of the elements, identified in the first subfield.

Subfield 257A - Bridge Element or Elements which Control Posting: This subfield is used to indicate the bridge element(s) that control the need for posting. This field contains the parameters listed below:

Parameters:

Deck

Superstructure

Substructure

Deck + Super

Deck + Sub

Super + Sub

Deck + Super + Sub

Culvert

Not rated

Subfield 257B - Damaged Condition of Element(s) Identified in Subfield 257A: This subfield is used to indicate the condition of the element(s) that control the need for posting. This field contains the parameters listed below:

Parameters:

None / Condition Noted

Under Designed

Deterioration

Impact

Flood/Scour

Fire

Other

Not rated

Examples:

Description	257A	257B
Fire damaged deck and girders	Deck + Super	Fire
Under designed deck	Deck	Under Designed
Under designed girder	Superstructure	Under Designed
Substructure condition code = 3	Substructure	Deterioration
Scour at foundations	Substructure	Flood/Scour
Bridge collapse due to vehicle impact	Deck + Super + Sub	Impact
Bridge rated, posting not required	Deck + Super + Sub	None / Condition Noted
Bridge not rated and not posted	Not Rated	Not Rated

ITEM 258A—LAST POST CHANGE REASON

This item identifies the reason for the last posting change. This field contains the parameters listed below:

Parameters:

Signs Erected

Signs Changed

Signs Removed

Never Posted

ITEM 258B—LAST POST CHANGE DATE

This item identifies the date of the last posting change. If the exact date of the posting change is unknown, provide an estimate. If the bridge has never been posted, code the field 1/1/1900.

ITEM 259—POSTING CHART INDICATOR

This item is designed to aid in the development of the state and county posting charts. The posting chart indicator is a flag which indicates the way in which the structure should be handled in order to print the appropriate posting report. For example, on state routes not all posted bridges are included on the posting chart and map because they may not restrict the route. An example is a closed bridge where traffic is routed to a parallel structure which is legal, so there is no weight restriction involved. The posting chart indicator would show that this bridge, even though posted, should not be put on any posting chart. This field contains the parameters listed below:

<u>Parameter:</u>

Include on Posting Chart

Closed

Closed – Detour in Place

Closed – Replace

Closed – Replace + Detour

Information Needed

More Information Needed

PE Inspection Required

Recommend Closing

Info Received, Not Rated

Culvert

Leave Off Posting Chart

ITEM 261—DATE OF TEMPORARY STRENGTHENING

This item identifies the date of the temporary strengthening. Temporary improvements are sometimes made to a structure to increase its load carrying capacity. Since the improvements are temporary, the coding of the inventory and operating ratings do not change. If no temporary improvements have been made, then code this item 1/1/1900. Refer to Item 103-Temporary Structure for additional information on temporary strengthening.

ITEM 262—TYPE OF TEMPORARY STRENGTHENING

This item identifies the predominant form of temporary strengthening used to increase the load-carrying capacity of a bridge. This item is composed of two subfields. The first subfield shows the bridge element, and the second subfield identifies the type of temporary strengthening.

<u>Subitem 262A - Bridge Element Strengthened:</u> Use the following parameters to indicate the bridge element which has been strengthened to increase its load carrying capacity.

Parameters:

Deck

Superstructure

Substructure

Deck + Super

Deck + Sub

Super + Sub

Deck + Super + Sub

Culvert

None

Subitem 262B - Type of Temporary Strengthening: Use the following parameters to indicate the type of strengthening used to increase the load carrying capacity.

Parameters:

Other

Cover Plates

Additional Reinforcement

Shear Studs

Composite Material

False Bent

Rip Rap

Splice

None

Examples:

Description	262A	262B
Spliced timber piles	Substructure	Splice
Cover plates on steel stringers	Superstructure	Cover Plates
False bent at midspan	Superstructure	False Bent
False bent at girder end (because girder ends failing)	Superstructure	False Bent
False bent at girder end (because bent/piles failing)	Substructure	False Bent
Riprap in scour hole at foundation	Substructure	Rip Rap
Steel plate over hole in deck	Deck	Cover Plates

Composite strips on RCDGs	Superstructure	Composite Material
Turn non-composite steel bridge into a composite one	Superstructure	Shear Studs
No temporary strengthening	None	None

ITEM 265—STANDARD DRAWINGS MAIN SPAN

This item identifies the type of standard used for the main span. For a large number of older bridges the project drawings do not include the drawings for any bridges contained in the project. Instead, they just reference the applicable standards. Therefore, this field is used to record the standard used for the main span. When the main spans are built according to more than one standard, then the predominant standard is coded. If no standard was used, code this subfield with all zeroes.

ITEM 266—STANDARD DRAWINGS APPROACH SPAN

This item identifies the type of standard used for the approach span. For a large number of older bridges the project drawings do not include the drawings for any bridges contained in the project. Instead, they just reference the applicable standards. Therefore, this field is used to record the standard used for the approach span. When the approach spans are built according to more than one standard, then the predominant standard is coded and the remaining standards are listed on the General Narrative Form (BI-13). If no standard was used, code this subfield with all “N”.

ITEM 31—LIVE LOAD

This item indicates the live load for which the structure was designed. For railroads, the numerical value of the railroad loading is recorded on the form. Classify any other loading, when feasible, using the nearest equivalent of the following loadings. This information is given on the bridge plans or bridge card if available. This field contains the parameters listed below:

Code	Description
1	H 10
2	H 15
3	HS 15
4	H 20
5	HS 20
6	HS 20 + Mod
7	Pedestrian
8	Railroad
9	HS 25
A	HL 93
B	Greater than HL 93
C	Other
0	Other or Unknown

Inventory – State Items Subtask

Structure Inventory and Appraisal
Date: ______________

FORM: BI-6 — STR. NUM.: OAL0008 240075.014-1 — Sheet: 8

BIN: 018022 — 1 REC — Printed: 10/17/2014

Inventory - State Items Subtask

CULVERT

	CURRENT	NEW
237) CULVERT TYPE	Not Applicable	____________
233A) NUMBER OF BARRELS OR PIPES	0	____________
233B) BARREL LENGTH	0.00 ft	____________ft
233C) BARREL SPAN	0.00 ft	____________ft
233D) BARREL HEIGHT	0.00 ft	____________ft
233E) DEPTH OF FILL	0.00 ft	____________ft

TYPE

	CURRENT	NEW
232) HORIZONTAL AND/OR VERTICAL CURVE	Horizontal Curve	____________
240A) FRACTURE CRITICAL STRUCTURE GROUP TYPE	Not Applicable	____________
244A) BEGIN ABUTMENT TYPE	Spill-Through Abutment	____________
244B) BEGIN ABUTMENT CAP MATERIAL	Reinforced Concrete	____________
244C) BEGIN ABUTMENT CAP TYPE	Cast in Place	____________
244D) BEGIN ABUTMENT FOUNDATION	Steel H-Piles	____________
245A) ENDING ABUTMENT TYPE	Spill-Through Abutment	____________
245B) ENDING ABUTMENT CAP MATERIAL	Reinforced Concrete	____________
245C) ENDING ABUTMENT CAP TYPE	Cast in Place	____________
245D) ENDING ABUTMENT FOUNDATION	Steel H-Piles	____________
246A) MAIN SPAN PIER MATERIAL PRIMARY	Reinforced Concrete	____________
MAIN SPAN PIER MATERIAL SECONDARY	Not Applicable	____________
246B) MAIN SPAN PIER TYPE PRIMARY	5 or + Column Pier Bent	____________
MAIN SPAN PIER TYPE SECONDARY	Not Applicable	____________
246C) MAIN SPAN PIER CAP MATERIAL PRIMARY	Reinforced Concrete	____________
MAIN SPAN PIER CAP MATERIAL SECONDARY	Not Applicable	____________
246D) MAIN SPAN PIER CAP STRUCTURE PRIMARY	Cast-in-Place	____________
MAIN SPAN PIER CAP STRUCTURE SECONDARY	Not Applicable	____________
246E) MAIN SPAN PIER FOUNDATION TYPE PRIMARY	Steel H-Piles	____________
MAIN SPAN PIER FOUNDATION TYPE SECONDARY	Not Applicable	____________
247A) APPROACH SPAN PIER MATERIAL PRIMARY	Not Applicable	____________
APPROACH SPAN PIER MATERIAL SECONDARY	Not Applicable	____________
247B) APPROACH SPAN PIER TYPE PRIMARY	Not Applicable	____________
APPROACH SPAN PIER TYPE SECONDARY	Not Applicable	____________
247C) APPROACH SPAN PIER CAP MATERIAL PRIMARY	Not Applicable	____________
APPROACH SPAN PIER CAP MATERIAL SEC.	Not Applicable	____________
247D) APPROACH SPAN PIER CAP STRUCTURE PRIM.	Not Applicable	____________
APPROACH SPAN PIER CAP STRUCTURE SEC.	Not Applicable	____________
247E) APPROACH SPAN PIER FOUNDATION TYPE PRIM.	Not Applicable	____________
APPROACH SPAN PIER FOUNDATION TYPE SEC.	Not Applicable	____________

PAINT

	CURRENT	NEW
267) DATE LAST PAINTED	01/01/1900	____/____/____
271A) PRIMER PAINT TYPE	Not Applicable	____________
271B) INTERMEDIATE PAINT TYPE	Not Applicable	____________
271C) FINISH PAINT TYPE	Not Applicable	____________
271D) UNDERCOAT PAINT TYPE	Not Applicable	____________
273) PAINT EXTENT	Not Applicable	____________
274) PAINT COST	0.00	____________

Figure 51: State Items Subtask

ITEM 237—CULVERT TYPE

This item identifies the culvert type. This field contains the parameters listed below:

Parameter:

Other

Reinforced Concrete Box Culvert

Precast Concrete Box Culvert

Corrugated Metal Pipe-Round

Corrugated Metal Pipe-Arch

Corrugated Metal Pipe--Span and Rise

Concrete Pipe Round

Concrete Pipe Arch

Concrete Pipe--Span and Rise

Steel Plate Arch

Aluminum Plate-Arch

Not Applicable (structure is not a culvert)

ITEM 233A – NUMBER OF BARRELS OR PIPES

This item identifies the number of barrels or pipes in the culvert. If the structure is a bridge, then enter a zero into the subfield to indicate "not applicable."

ITEM 233B – BARREL LENGTH

This item identifies the barrel length of the culvert. The barrel length measurement should be made on the bottom slab or floor of the barrel from end to end. If the structure is a bridge, then enter a zero into the subfield to indicate "not applicable."

ITEM 233C – BARREL SPAN

This item identifies the barrel span of the culvert. The span is the width of the barrel, measured perpendicular to the centerline of the barrel. If different size culverts or pipes occur at the same location, then code the span for the largest barrel or pipe present. If the structure is a bridge, then enter a zero into the subfield to indicate "not applicable."

ITEM 233D – BARREL HEIGHT

This item identifies the barrel height of the culvert. If different size culverts or pipes occur at the same location, then code the height for the largest barrel or pipe present. If the structure is a bridge, then enter a zero into the subfield to indicate "not applicable."

ITEM 233E – DEPTH OF FILL

This item identifies the depth of fill of the culvert. If different size culverts or pipes occur at the same location, then code the depth of fill for the largest barrel or pipe present. If the structure is a bridge, then enter a zero into the subfield to indicate "not applicable."

ITEM 232—HORIZONTAL AND/OR VERTICAL CURVE

This item identifies whether all or part of the bridge is on either a horizontal and/or a vertical curve. This field contains the parameters listed below:

Parameters:

Bridge not on horizontal or vertical curve

Bridge on horizontal curve

Bridge on crest vertical curve

Bridge on sag vertical curve

Bridge on horizontal and crest vertical curves

Bridge on horizontal and sag vertical curves

ITEM 240A—FRACTURE CRITICAL STRUCTURE GROUP TYPE

This item identifies the structure group type of a fracture critical structure. If there are multiple fracture critical members or if the bridge meets the criteria for two or more groups, enter the first group type applicable in the list below. If the inspector has questions about the type of group, the Department's Bridge Engineer should be consulted. If the structure is not fracture critical, then code this field "Not Applicable". This field contains the parameters listed below:

Parameters:

Other

Two-Girder Bridge

Truss Bridge

Tied Arch

Steel Cross-Girder Pier Cap

Suspension Bridge

Rigid Frame Steel Pier

Suspended Span

Not Applicable

ITEM 244A – BEGIN ABUTMENT TYPE

This item identifies the beginning abutment type for the structure. The beginning abutment is identified by traveling in the direction of the inventory route. This field contains the parameters listed below:

<u>Parameters:</u>

Other

Stub

Cantilever

Gravity concrete

Gravity stone - masonry

Counterfort

Integral

Cellular

Spill-through abutment

Reinforced concrete pad resting on mechanically stabilized earth retaining wall

Pile supported reinforced concrete pad behind face of mechanically stabilized earth retaining wall

Precast modular earth filled wall

Pile bent

Gabion

Reinforced earth

Double wall

Not Applicable

ITEM 244B – BEGIN ABUTMENT CAP MATERIAL

This item identifies the beginning abutment cap material for the structure. The beginning abutment is identified by traveling in the direction of the inventory route. This field contains the parameters listed below:

<u>Parameters:</u>

Other

Timber

Steel

Reinforced concrete

Plain concrete

Prestressed concrete

Post-tensioned concrete

Stone or masonry

Not Applicable

ITEM 244C – BEGIN ABUTMENT CAP TYPE

This item identifies the beginning abutment cap type for the structure. The beginning abutment is identified by traveling in the direction of the inventory route. This field contains the parameters listed below:

<u>Parameters:</u>

Other

Beam type

Cast in place

Precast earthfilled wall

Not Applicable

ITEM 244D – BEGIN ABUTMENT FOUNDATION

This item identifies the beginning abutment foundation type for the structure. The beginning abutment is identified by traveling in the direction of the inventory route. This field contains the parameters listed below:

<u>Parameters:</u>

Other

Spread footings on solid bedrock

Cast-in-place concrete piles

Precast concrete piles

Prestress concrete piles

Steel H-piles

Steel pipe piles

Timber piles

Drilled shaft

Sealed footing

Pedestals

Spread footing on hard bedrock (erodible bedrock such as limestone, granite, claystone, clay shales, some silt stone, shales and all weathered)

Spread footings on soils (sand, gravel, silt, and clay)

Unknown

Not Applicable

Examples:

Pile bent with cast-in-place concrete cap on steel H-piles

244A: Pile bent
244B: Reinforced concrete
244C: Cast in place
244D: Steel H-piles

Cantilevered abutment made of reinforced concrete; cast in place on rock spread footing

244A: Cantilever
244B: Reinforced concrete
244C: Cast in place
244D: Spread footings on solid bedrock

ITEM 245(A – D)—ENDING ABUTMENT COMPONENTS

These items capture information about the ending abutment components. The ending abutment is identified by traveling in the direction of the inventory route. This item is divided into four subitems. The parameters used for these items are the same as those for the Item 244(A – D) – Beginning Abutment Components.

ITEM 246(A – E)—MAIN SPAN PIER COMPONENTS

These items capture the description of two types of piers for the main span(s) of each bridge. These items consist of two groups. The first group is for the predominant pier type on the main span, identified as the primary group. The second group is for the next most predominant pier type on the main span, indicated as the secondary group. If there is only one type of pier, select "Not Applicable."

ITEM 246A – MAIN SPAN PIER MATERIAL

This item identifies the pier material for the main span in the structure. This field contains the parameters listed below:

Parameters:

Other

Timber

Steel

Reinforced concrete

Plain concrete

Prestressed concrete

Post-tensioned concrete

Stone or Masonry

Not Applicable

ITEM 246B – MAIN SPAN PIER TYPE

This item identifies the pier type of the main span in the structure. This field contains the parameters listed below:

Parameters:

Other

1 Column/hammer head

2 Column pier bent

3 Column pier bent

4 Column pier bent

5 or more column pier bent

Solid

Not Applicable

ITEM 246C – MAIN SPAN PIER CAP MATERIAL

This item identifies the pier cap material for the main span in the structure. This field contains the parameters listed below:

Parameters:

Other

Timber

Steel

Reinforced concrete

Plain concrete

Prestressed concrete

Post-tensioned concrete

Stone or masonry

Not Applicable

ITEM 246D – MAIN SPAN PIER CAP STRUCTURE

This item identifies the pier cap structure for the main span in the structure. This field contains the parameters listed below:

Parameters:

Other

Beam type

Cast-in-place

Precast

Not Applicable

ITEM 246E – MAIN SPAN PIER FOUNDATION TYPE

This item identifies the pier foundation type for the main span in the structure. This field contains the parameters listed below:

Parameters:

Other

Spread footings on solid bedrock

Cast-in-place concrete piles

Precast concrete piles

Prestressed concrete piles

Steel H-piles

Steel pipe piles

Timber piles

Drilled shaft

Sealed footing

Pedestals

Spread footing on hard bedrock (erodible bedrock such as limestone, granite, claystone, clay shales, some silt stone, shales and all weathered)

Spread footings on soils (sand, gravel, silt and clay)

Unknown

Not Applicable

ITEM 247(A – E)—APPROACH SPAN PIER COMPONENTS

These items capture the description of two types of piers for the approach span(s) of each bridge. These items consist of two groups. The first group is for the predominant pier type on the main span, identified as the primary group. The second group is for the next most predominant pier type on the main span, indicated as the secondary group. If there is only one type of pier, select “Not Applicable”. The parameters used for these items are the same as those for the Item 246(A – E) – Main Span Pier Components.

ITEM 267—DATE LAST PAINTED

This item identifies the date that the bridge last received a complete (or nearly complete) painting. It identifies the date in which the bridge painting was completed. If the date is unknown, provide an estimated date. If the bridge has never been painted, then code this field “1/1/1900”.

ITEM 271A – PRIMER PAINT TYPE

This item identifies the primer paint type that was used when painting the bridge. This field contains the parameters listed below:

Parameters:

Alkyd

Acrylic

Epoxy (Zinc Rich)

Inorganic Zinc

Mastic

Not Applicable

Other

Red Lead

ITEM 271B – INTERMEDIATE PAINT TYPE

This item identifies the intermediate paint type that was used when painting the bridge. This field contains the parameters listed below:

Parameters:

Alkyd

Acrylic

Epoxy (Zinc Rich)

Inorganic Zinc

Mastic

Not Applicable

Other

Red Lead

ITEM 271C – FINISH PAINT TYPE

This item identifies the finish paint type that was used when painting the bridge. This field contains the parameters listed below:

Parameters:

Alkyd

Acrylic

Not Applicable

Other

Red Lead

Silver/Aluminum

Urethane

Vinyl

ITEM 271D – UNDERCOAT PAINT TYPE

This item identifies the undercoat paint type that was used when painting the bridge. This field contains the parameters listed below:

Parameters:

Alkyd

Acrylic

Not Applicable

Other

Red Lead

Silver/Aluminum

Urethane

Vinyl

ITEM 273—PAINT EXTENT

This item identifies the extent of the area which was painted. This field contains the parameters listed below:

Description

Joint and bearing only

Minor spot work on finish coat

Moderate spot work on finish coat

Spot work, less than 60% of finish coat

Spot work, greater than 60% of finish coat

20% to 39% of steel surface area, all coats

40% to 59% of steel surface area, all coats

60% or more of steel surface area, all coats

Entire bridge

Not Applicable

Unknown

ITEM 274—PAINT COST

This item identifies the total cost of the last painting of the bridge. The cost is entered to the nearest thousand dollars. For example, a bridge painting project which cost $1,520,000 would be entered with a code of "1520." Code "0.00" if the bridge has not been painted or "UUUUU" if the cost is unknown.

Inspection Summary and Bridge Replacement Task

FORM: BI-6	Structure Inventory and Appraisal STR. NUM.: OAL0008 240075.014-1	Date: ______________ Sheet: 9
BIN: 018022 1 REC		Printed: 10/17/2014

INSPECTION

	CURRENT
90) INSPECTION DATE	2/1/2012
91) FREQUENCY	24 mo
93A) FC INSPECTION DATE	N/A
92A) FC FREQUENCY	
93B) UW INSPECTION DATE	N/A
92B) UW FREQUENCY	
93C) SI DATE	N/A
92C) SI FREQUENCY	

CONDITION

	CURRENT
58) DECK	7 Good
59) SUPER	8 Very Good
60) SUB	7 Good
61) CHANNEL/CHANNEL PROTECTION	7 Minor Damage
62) CULVERT	N N/A (NBI)

BRIDGE REPLACEMENT

	CURRENT
PROGRAM YEAR	0
PRIORITY	F
LOAD DEFICIENCY POINTS	0.0000
WIDTH DEFICIENCY POINTS	0.0000
VERT. CIR. DEFICIENCY POINTS	0.0000
CONDITION DEFICIENCY POINTS	0.0000
TOTAL DEFICIENCY POINTS	0.0000
LOCAL RANK	739
STATEWIDE RANK	5,579

INSPECTOR'S SIGNATURE DATE INSP. NBIS CERT NO. or ALA. PROF. ENGR. NO.

REVIEWER'S SIGNATURE DATE REVIEWER'S TITLE

Figure 52: Inspection Summary and Bridge Replacement Task

This page summarizes the inspection information entered for the most recent inspection and the bridge replacement information. The bridge inspection information is entered as part of the BI-5 form but is included here for reference. The bridge replacement information is either entered in by the Maintenance Bureau personnel or is automatically calculated by the database.

ITEM 90—INSPECTION DATE

This item is updated when creating a new inspection after each routine inspection. This routine inspection date may be different from the inspection dates recorded for critical features, see Item 93.

ITEM 91—FREQUENCY

This item identifies the number of months between designated routine inspections for the structure.

ITEM 93A—FC INSPECTION DATE

This item identifies the last Fracture Critical Inspection date.

ITEM 92A—FC FREQUENCY

This item identifies the frequency for the Fracture Critical Inspection.

ITEM 93B—UW INSPECTION DATE

This item identifies the last Underwater Inspection date.

ITEM 92B—UW FREQUENCY

This item identifies the frequency for the Underwater Inspection.

ITEM 93C—SI DATE

This item identifies the last Special (Interim) Inspection date.

ITEM 92C—SI FREQUENCY

This item identifies the frequency for the Special (Interim) Inspection.

ITEM 58—DECK

This item identifies the overall NBI Deck Condition Rating.

ITEM 59—SUPER

This item identifies the overall NBI Superstructure Condition Rating.

ITEM 60—SUB

This item identifies the overall NBI Substructure Condition Rating.

ITEM 61—CHANNEL/CHANNEL PROTECTION

This item identifies the overall NBI Channel/Channel Protection Condition Rating.

ITEM 62—CULVERT

This item identifies the overall NBI Culvert Condition Rating.

PROGRAM YEAR

This item identifies the year the bridge is programmed to be replaced.

PRIORITY

This item identifies the category of the bridge replacement priority. This field contains the categories listed below:

Category	Description
F	Not a priority
E	Project exists but a low priority. (Plan development should not be performed for bridges in this category.)
D	Projects may be authorized for PE.
C	Projects are the highest priority.
B	Plans have been submitted to Construction Bureau.
A	Plans have been submitted to Office Engineer.
L	Project has been let to contract.
X	County bridge.

LOAD DEFICIENCY POINTS

This item indicates the deficiency of a structure to carry the maximum legal load for its roadway type. The deficiency is automatically calculated by the computer based upon level of service criteria and information contained in the bridge database. The deficiency point value ranges from zero to 40.0 points.

WIDTH DEFICIENCY POINTS

This item indicates the amount of deficiency associated with restricted width structures. The value is calculated automatically by the computer based upon level of service criteria and information contained in the bridge database. The deficiency points for bridge width range from zero to 20.0 points.

VERT. CIR. DEFICIENCY POINTS

This item indicates the deficiency points for inadequate vertical clearances over or under structures. The value is automatically calculated by the computer based upon level of service criteria and information contained in the bridge database. The deficiency points range from zero to 10.0 points.

CONDITION DEFICIENCY POINTS

This item indicates the amount of deterioration experienced by a structure. Deficiency points are automatically calculated by the computer based upon level of service criteria and condition ratings contained in the bridge database. The deficiency points range from zero to 30.0 points.

TOTAL DEFICIENCY POINTS

This item contains the sum of load, width, vertical clearance, physical condition and special condition deficiency points. This field is four digits in length. The value is automatically calculated by the computer.

LOCAL RANK

This item shows the ranking of a local structure compared to other structures within that group. For example, if the local structure is owned by a city, it will be compared to other bridges owned by that city. If the local structure is owned by a county, it will be compared with other structures owned by that county. If the structure is owned by the State, it will be compared to other state owned structures in the same Area.

STATEWIDE RANK

This item shows the ranking of the structure compared to other structures in the state. For example, if the local structure being considered is a city bridge, it will be compared with all other city bridges within the state. A ranking of one indicates the bridge or culvert with the greatest number of deficiency points. The rankings are automatically calculated by the database.

INSPECTORS SIGNATURE AND DATE

The inspector who performed the field inspection must sign and date the form in the space provided.

INSP. NBIS CERTIFICATION NO. OR ALA. PROF. ENG. NO.

The inspector must be NBIS certified even if already a registered professional engineer in Alabama. Use the spaces provided to write in the NBIS certification number and their Alabama Professional Engineers Number if this applies.

REVIEWER'S SIGNATURE, TITLE, AND DATE

Using the spaces provided, the person who reviewed the inspection results should sign, date, and give their title.

Chapter 7: Schedule Task

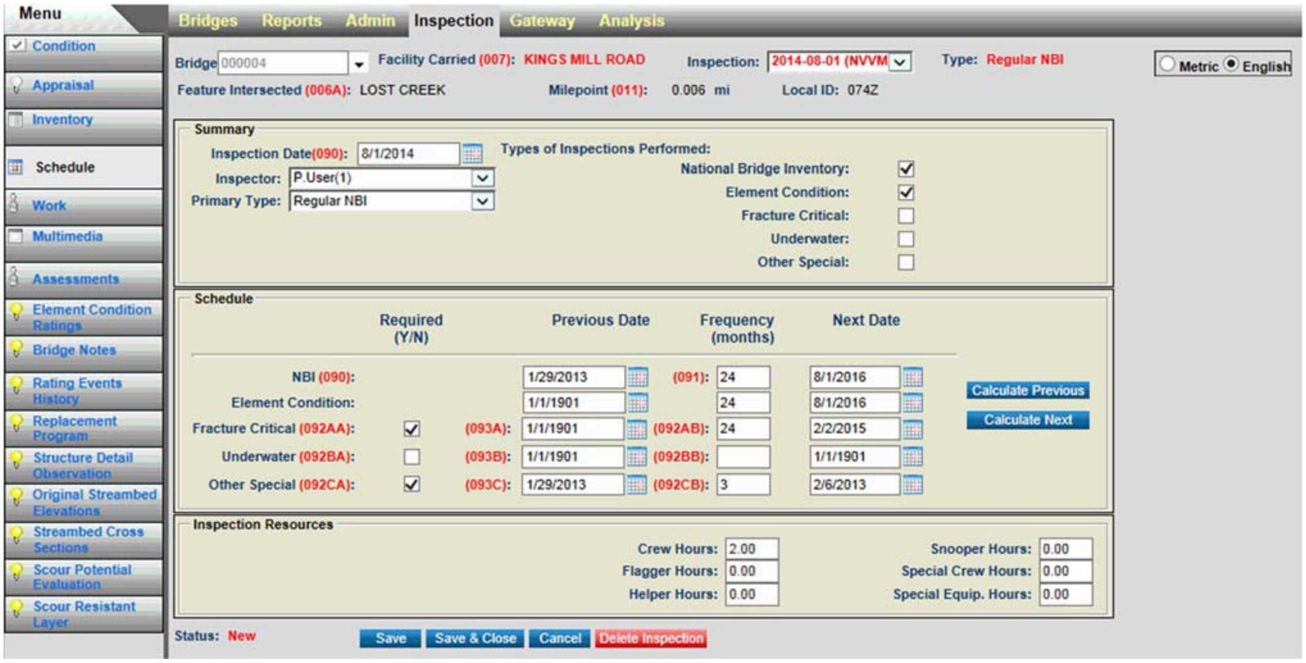


Figure 53: Schedule Task

The Schedule Task shows scheduling information about the bridge, including which types of inspections are required and the frequencies for each of those inspection types. Any changes to inspection types or frequencies as required by ALDOT Guidelines for Operations can be made on this screen. For example, if the structure now requires an interim inspection, this task can be updated by checking the Other Special box and adding a corresponding inspection frequency for this item.

*The Schedule Task should **NOT** be used to create a new inspection. The New Inspection Task under the Bridge Tab must be used to enter a new inspection.

ITEM 90—INSPECTION DATE

This item is updated when creating a new inspection**.** This routine inspection date may be different from the inspection dates recorded for critical features, see Item 93. When entering the inspection date use the calendar icon to select the appropriate date.

Due to the possibility of confusing the dates of upcoming routine and interim inspections, inspectors are urged to keep careful and specific documentation of interim inspections in the bridge folder. To promote uniformity, this is accomplished by using Form BI-5 and writing *ROUTINE* or *INTERIM* in the Reason for Inspection Field.

NBI PREVIOUS DATE

This item identifies the date of the previous NBI Inspection. This field is updated when a new inspection is created.

ITEM 91— NBI FREQUENCY

This item identifies the number of months between designated routine inspections for the structure. The majority of structures in Alabama will have a 24 month frequency. The inspection frequency will not exceed a 24 month interval between routine inspections, but it may be less than 24 months if deemed necessary.

ELEMENT PREVIOUS DATE

This item identifies the date of the previous Element Inspection. This field is updated when a new inspection is created.

ELEMENT FREQUENCY

This item identifies the number of months between designated Element Inspections for the structure. The majority of structures in Alabama will have a 24 month frequency. The inspection frequency will not exceed a 24 month interval between Element Inspections, but it may be less than 24 months if deemed necessary.

ITEM 92AA—FRACTURE CRITICAL REQUIRED

This is a check box indicating whether or not this structure requires a Fracture Critical Inspection. If the structure requires a Fracture Critical Inspection, then this box should be checked, but if the structure does not require a Fracture Critical Inspection, then this box should not be checked. For more information on Fracture Critical Bridges please see the Fracture Critical Members and Fracture Critical Bridges section of this manual.

ITEM 93A—FRACTURE CRITICAL PREVIOUS DATE

This item identifies the date of the previous Fracture Critical Inspection. This field is updated when a new inspection is created. If the structure is not fracture critical, then this field will contain 01/01/1901.

ITEM 92AB—FRACTURE CRITICAL FREQUENCY

This item identifies the frequency for the Fracture Critical Inspection. The maximum allowable inspection frequency for a Fracture Critical Detail in Alabama is 24 months. This inspection frequency will not exceed a 24 month interval between Fracture Critical Inspections, but it may be less than 24 months if deemed necessary. If the structure is not fracture critical, then this field should be left blank.

ITEM 92BA—UNDERWATER REQUIRED

This is a check box indicating whether or not this structure requires an Underwater Inspection. If the structure requires an Underwater Inspection, then this box should be checked, but if the structure does not require an Underwater Inspection, then this box should not be checked. For more information on Underwater Inspections please see the Underwater Inspection of Bridges section of this manual.

ITEM 93B—UNDERWATER PREVIOUS DATE

This item identifies the date of the previous Underwater Inspection. This field is updated when a new inspection is created. If the structure does not require an Underwater Inspection, then this field will contain 01/01/1901.

ITEM 92BB—UNDERWATER FREQUENCY

This item identifies the frequency for the Underwater Inspection. The maximum allowable inspection frequency for an Underwater Inspection for a state owned structure in Alabama is 24 months unless approved by the Maintenance Bureau of ALDOT. The maximum allowable inspection frequency for an Underwater Inspection for a county or city owned structure in Alabama is 48 months. This inspection frequency will not exceed the intervals listed above, but may be less if deemed necessary. If the structure does not require an Underwater Inspection, then this field should be left blank.

ITEM 92CA—OTHER SPECIAL REQUIRED

This is a check box indicating whether or not this structure requires a Special (Interim) Inspection. If the structure requires a Special (Interim) Inspection, then this box should be checked, but if the structure does not require a Special (Interim) Inspection, then this box should not be checked. For more information on Special (Interim) Inspections please see ALDOT"S Guidelines for Operations in Appendix G.

ITEM 93C—OTHER SPECIAL PREVIOUS DATE

This item identifies the date of the previous Special (Interim) Inspection. This field is updated when a new inspection is created. If the structure does not require a Special (Interim) Inspection, then this field will contain 01/01/1901.

ITEM 92CB—OTHER SPECIAL FREQUENCY

This item identifies the frequency for the Special (Interim) Inspection. Using ALDOT's Guidelines for Operations, an Interim Inspection is defined as an inspection at least every 12 months; or more often if deemed necessary by the owner's bridge inspector, the Emergency Bridge Inspection team, or the appropriate Guideline for Operation. For all posted bridges (where Item 41 is coded as "B" or "P") Item 91 is coded as 12 months or less. The designated inspection interval can also vary from inspection to inspection depending on the condition of the bridge at the time of the inspection. Please see Appendix G of this manual for more details on how to determine the appropriate Interim Inspection Frequency. If the structure does not require a Special (Interim) Inspection, then this field should be left blank.

CHAPTER 8: BI-9 – BRIDGE MAINTENANCE NEEDED

Bridge Maintenance Estimate

FORM: BI-9 STR. NUM.: OAL0002 450091.240+1 Sheet: 1
BIN: 000582 1 REC Printed: 9/3/2014

INSPECTED BY: ______________________ DATE: __________

REVIEWED BY: ______________________ DATE: __________

ACT CODE	DESCRIPTION	UNITS	QTY	PRIORITY	STAT
B12	MINOR SUPER REP-CONCRETE	HR	1.00	Low	

NC:_____ REMARK: ALL CRACKS AND SPALLS @ MID-SPAN SHOULD BE MONITORED.
C:_____ NEW QTY:_____________ NEW PRIORITY:_____________
NEW REMARK:____

B18	MINOR SUB REPAIR-CONCRETE	HR	1.00	Low	

NC:_____ REMARK: OPEN CRACKS @ ABUTS & CRACKS ON CAPS UNDER GRDRS SHOULD BE MONITORED.
C:_____ NEW QTY:_____________ NEW PRIORITY:_____________
NEW REMARK:____

B38	OTHER STRUCTURE MAINT.	HR	10.00	Medium	

NC:_____ REMARK: THE FORWARD APPROACH SHOULD BE LEVELED AND THE CHEVRON SIGNS NEED REPLACED.
C:_____ NEW QTY:_____________ NEW PRIORITY:_____________
NEW REMARK:____

B46	VEGETATION CONTROL	HR	16.00	Medium	

NC:_____ REMARK: TREES AND BRUSH SHOULD BE CUT FROM UNDER AND AROUND STRUCTURE.
C:_____ NEW QTY:_____________ NEW PRIORITY:_____________
NEW REMARK:____

NEW ACTIVITY: B:__________ ACTIVITY DESCRIPTION: ______________
UNIT:__________ QTY: __________ PRIORITY: __________
NEW REMARK: ____

NEW ACTIVITY: B:__________ ACTIVITY DESCRIPTION: ______________
UNIT:__________ QTY: __________ PRIORITY: __________
NEW REMARK: ____

NEW ACTIVITY: B:__________ ACTIVITY DESCRIPTION: ______________
UNIT:__________ QTY: __________ PRIORITY: __________
NEW REMARK: ____

NEW ACTIVITY: B:__________ ACTIVITY DESCRIPTION: ______________
UNIT:__________ QTY: __________ PRIORITY: __________
NEW REMARK: ____

Figure 54: BI-9 Form

INTRODUCTION

This section provides information on how to complete the BI-9 form, Bridge Maintenance Needed. The BI-9 form is used at each bridge inspection performed on a structure to record and quantify any bridge maintenance needs present. This information will be reported to the appropriate authorities so that maintenance needed can be scheduled.

Descriptions on how to record each item on this form will be provided in this section. Refer to the ALDOT BrM User Manual for instructions on entering this information into the computer.

BRIDGE IDENTIFICATION NUMBER (BIN)

The BIN is the 6-digit code used to uniquely identify the bridge. For further information on the BIN, refer to the BI-1 section of this manual.

STRUCTURE NUMBER

The structure number refers to the Alabama ID found on the Inventory – Identification Subtask of the BI-6.

INSPECTED BY/DATE

The name of the individual who performed the inspection will be entered in this space, and the date in which the inspection was performed.

REVIEWED BY/DATE

The name of the individual who performed the review of the BI-9 form will be entered in this space and the date in which the form was reviewed.

ACTIVITY CODE AND DESCRIPTION OF MAINTENANCE FUNCTION

Table 4 provides the acceptable maintenance activity codes. Please refer to the Table below for the description, purpose, authorization and scheduling methods for each activity code.

Code	Maintenance Activity	Description	Units
B01	Deck Cleaning	Cleaning of deck by either manual or mechanical means, which includes deck sweeping.	Employee Hours
B02	Curb/Rail/Fence Repair	Maintenance, repair or replacement of all types of bridge rails, handrails, posts, post blocks, post brackets, curbs, wheelguards, sidewalks, and other elements related to the above.	Feet
B03	Joint Seal Installation/Repair	Maintenance and repair of open and sealed bridge joints, including grouting anchors, removal, installation and/or replacement of sealed joint material. **If replacing seal involves structural work, refer to B04.**	Feet
B04	Joint Structural Repair	Structural maintenance and repair of open and sealed bridge joints including and/or replacement of plates, angles, anchors, and bolts. **If only repairing joint seal, refer to B03.**	Feet
B05	Minor Deck Repair - Steel	Maintenance, repair or replacement of a small portion of the steel deck. Includes the • placement/removal or repair of approved overlays, • clean-up, capture, containment, and disposal of any residue.	Square Feet
B06	Minor Deck Repair - Concrete	Maintenance, repair or replacement of a small portion of the concrete deck. Includes the • placement/removal or repair of approved overlays, • clean-up, capture, containment, and disposal of any residue.	Square Feet
B07	Minor Deck Repair - Timber	Maintenance, repair or replacement of a small portion of the timber deck. Includes the • placement/removal or repair of approved overlays, • clean-up, capture, containment, and disposal of any residue.	Square Feet
B08	Major Deck Repair - Steel	Major repair or replacement of a significant portion of the steel deck or steel components such as grid deck (filled or open) and plates. Includes the • clean-up, capture, containment, and disposal of any residue • placement or removal of overlay.	Square Feet
B09	Major Deck Repair - Concrete	Major repair or replacement of a significant portion of the concrete deck. Includes the • clean-up, capture, containment, and disposal of any residue • placement or removal of overlay.	Square Feet
B10	Major Deck Repair - Timber	Major repair or replacement of a significant portion of the timber deck or timber components such as runners, and transverse or diagonal flooring or sub-flooring. Includes the • clean-up, capture, containment, and disposal of any residue • placement or removal of overlay.	Square Feet
B11	Minor Superstructure Member Repair - Steel	• Minor repair of steel superstructure elements such as beams, truss members, bracing, stiffeners, or replacement of rivets and bolts, etc.	Employee Hours
B12	Minor Superstructure Member Repair - Concrete	Minor repair of concrete superstructure members such as • spall repair • crack repair (epoxy injection)	Employee Hours
B13	Minor Superstructure Member Repair - Timber	Minor repair of timber superstructure members such as stringers and bracing	Employee Hours

B14	Major Superstructure Member Repair - Steel	Major repair or replacement of steel superstructure elements such as beams, girders, diaphragms, bracing, truss members, or cables.	Employee Hours

Table 4: Maintenance Activity Codes, Descriptions, and Units

Code	Maintenance Activity	Description	Units
B15	Major Superstructure Member Repair - Concrete	Major repair or replacement of concrete girders, diaphragms, girder ends, complete bearing assemblies replacement, and backwalls.	Employee Hours
B16	Major Superstructure Member Repair - Timber	Major repair or replacement of timber stringers and bracing. Includes installation of additional stringers or beams to enhance load carrying ability.	Employee Hours
B17	Minor Substructure Member Repair - Steel	Minor repair of steel piling, bracing, supports, caps, footings, abutments, and bents. Includes underwater repairs and extending of pile encasements.	Employee Hours
B18	Minor Substructure Member Repair - Concrete	Minor repair concrete piling, bracing, supports, caps, footings, abutments, and bents. Includes underwater repairs.	Employee Hours
B19	Minor Substructure Member Repair - Timber	Minor repair of timber piling, bracing, supports, caps, footings, abutments, and bents. Includes underwater repairs.	Employee Hours
B20	Major Substructure Member Repair - Steel	Major repair, replacement or addition to substructure members such as footings, caps, piers, bents, piling, and abutments. Includes underwater repairs.	Employee Hours
B21	Major Substructure Member Repair - Concrete	Major repair, replacement or addition to substructure members such as footings, caps, piers, bents, piling, and abutments. Includes underwater repairs.	Employee Hours
B22	Major Substructure Member Repair - Timber	Major repair, replacement or addition to substructure members such as footings, caps, piers, bents, piling, and abutments. Includes underwater repairs.	Employee Hours
B23	Bridge Painting - Spot	Cleaning and painting of a small portion (less than approximately 25%) of the paintable portions of the structure. This includes • cleaning by chemical or mechanical means, • capture and containment of residue as required, • the application of the paint system • clean-up and disposal of residue	Square Feet
B24	Bridge Painting - Partial	Cleaning and painting of a significant part (between approximately 25% and 75%) of the paintable portions of the structure. This includes • cleaning by chemical or mechanical means, • capture and containment of residue as required, • the application of the paint system clean-up and disposal of residue	Employee Hours
B25	Bridge Painting - Complete	Cleaning and painting of all or the majority (more than approximately 75%) of the paintable portions of the structure. This includes • cleaning by chemical or mechanical means, • capture and containment of residue as required, • the application of the paint system • clean-up and disposal of residue	Employee Hours
B26	Bridge Culvert Cleaning	Cleaning of bridge culverts (culverts exceeding 20 feet measured along centerline of roadway) including • cleaning drainage ditches to and from the structure • removing debris and deposits from the barrels • repairing and replacing rip-rap • cleanup and disposal of materials	Employee Hours

Table 4-cont'd: Maintenance Activity Codes, Descriptions, and Units

Code	Maintenance Activity	Description	Units
B27	Bridge Culvert Repair	Repair of bridge culverts (culverts exceeding 20 feet measured along centerline of roadway) including • repair of components such as top and bottom slab, cutoff walls, wing walls, aprons • filling or grouting voids cleaning and repair of drainage ditches to and from the structure ***are not included*** in this activity.	Employee Hours
B28	Light and Navigation-Light Repair	Maintenance or repair of illumination lights, navigation lights, electrical system and electrical appurtenances.	Employee Hours
B29	Drift Removal	Maintenance or repair required to remove all debris obstructing normal channel flow form all bridge structures.	Employee Hours
B30	Slope and Shore Protection Repair	Maintenance or repair to slope and shore protection devices, dolphins and pier protection systems including concrete and stone rip-rap and sheeting (steel, concrete, or timber). Includes placing additional shore protection devices such as sheeting, concrete and stone rip-rap to restrain accelerated erosion behind culvert and abutment wings and/or the repair or restoration of scour damage to culverts, abutments, or wing walls.	Employee Hours
B32	Vandalism Repair	Repair of bridge elements damaged as a result of vandalism. Includes removal of graffiti, political signs attached to the structure, unauthorized painting, lettering or markings.	Employee Hours
B33	Moveable Span Maintenance	Repair, replace, and/or service equipment, components, and facilities of the moveable span structure. Repairs to the deck, superstructure, substructure, and painting ***are not included*** in this activity.	Employee Hours
B34	Moveable Span Operations	Overhead costs necessary to the daily and continuing normal operation of the moveable span. Maintenance, repair, and service ***are not included*** in this activity.	Employee Hours
B35	Tunnel Maintenance	Repair, replace, and/or service equipment, components, and facilities of the tunnel.	Employee Hours
B36	Tunnel Operations	Overhead costs necessary to the daily and continuing normal operation of the tunnel. Maintenance, repair, and service ***are not included*** in this activity. See activity B35 "Tunnel Maintenance."	Dollars
B37	Bridge Inspection	Inspection of bridges by State or Division bridge inspection crew to evaluate the bridge in accordance with NBIS, AASHTO and FHWA inspection specifications. Also includes above water and underwater inspection done by contract or consultant.	Employee Hours
B38	Other Structure Maintenance	Other structure maintenance activities that are not specifically identified as separate activities.	Employee Hours
B41	Drain/Joint Cleaning	Applies to cleaning of drain holes, expansion joints, shoulder gutter, downspout; paved drainage troughs at bridge ends, curb and gutter.	Employee Hours
B42	Bent Cap, Beams and Beam	Seats	B43 Bearing

Devices and Assemblies-Installation, Maintenance, Repair	Applies to the cleaning of bent caps, beam seats, bearings and ends of beams, beam webs and bottom flanges.	Employee Hours
	Installation, maintenance, repair or complete replacement of bearing devices and assemblies including rollers, rockers & bolsters, elastomeric pads, etc.,	Employee Hours

Table 4-cont'd: Maintenance Activity Codes, Descriptions, and Units

Code	Maintenance Activity	Description	Units
B46	Vegetation Control	Removal of vegetation and trees to prevent fires and allow usage of equipment such as snoopers, reach alls, buckets trucks etc., Clearance of vegetation is from abutment to abutment under and around bridge structures with a maximum clearance of 30 feet on both the upstream and downstream side of bridge as measured from the bridge rail. Includes the removal and disposal of vegetation that poses a fire threat or hinders access to bridge structures.	Employee Hours
B47	Beaver Control	All costs related to the control of beaver activity around bridge structures and culverts. Includes dam removal, trapping and any other related activity at structures.	Employee Hours
B99	Bridge Maintenance Overhead	Bridge maintenance costs which are not readily identifiable to any other bridge maintenance function.	Employee Hours

Table 4-cont'd: Maintenance Activity Codes, Descriptions, and Units

WORK UNITS

This describes the unit of measure for the activity code. Refer to Table 4 for the appropriate units of each activity code. For example, for activity code B37-Bridge Inspection, the work units for this activity are employee hours. For activity code B03-Joint Repair, the appropriate unit of work is feet.

QUANTITY OF WORK

This item indicates the estimated quantity of work that needs to be performed for the chosen maintenance activity. The inspector must in some cases make a subjective judgment in estimating the quantity of work needed. If appropriate, this quantity of work should also include travel time in estimating units of work based on employee hours. This must be a number from 0 to 99999999.9 with a precision of one decimal place.

PRIORITY

This item identifies the priority of the work candidate. Each maintenance activity will have its own degree of urgency. It is the inspector's responsibility to determine the priority of each work candidate taking into account the severity of the maintenance needed and if the member needing attention is fracture critical. This field contains the parameters listed below:

Parameters:
High
Medium
Low

REMARKS

This item is a narrative field for the bridge inspector's detailed remarks about the location and nature of work that needs to be done.

CHAPTER 9: BI-13 – GENERAL NARRATIVE FORM

General Narrative Form

FORM: BI-13 | STR. NUM.: OAL0006 030239.81600 | Sheet: 2
BIN: 007641 | 1 REC | Printed: 9/3/2014

USER ID	DATE	TYPE	COMMENTS
Pontis	08/12/2003	G	JRS POWER LINES ON RIGHT SIDE AT BENT 6, WERE REMOVED AND REPLACED IN PVC CONDUIT THAT ARE STRAPPED TO THE RAILS AND RUN TO LIGHT STANDARDS. (CAUSE OF DRILL SHAFT CONSTRUCTION). DECK NEEDS CLEANING AND SOME DRAIN HOLES ARE STOPPED UP WITH DIRT.
Pontis	12/08/2003	S	SLS THIS STRUCTURE SHOULD BE MONITORED EVERY 24 MONTHS AS WELL AS DURING HIGH FLOW EVENTS. BASED ON CALCULATED SCOUR, THIS STRUCTURE MAY BECOME UNSTABLE AND NEED TO BE CLOSED.
Pontis	03/30/2005	G	JRS PROJECT NO. BH-373(6). BRIDGE REHABILATATION. FOUR DRILL SHAFTS WERE INSTALLED ON EACH SIDE OF BENT 6. A STRUCTURAL STEEL CAP WAS PLACED UNDER THE ORIGINAL CONCRETE CAP FOR SUPPORT. THE ORIGINAL TWO CONCRETE COLUMNS WERE REMOVED TO APPROX. 10 FT. ABOVE WATER LINE. PROJECT COMPLETED IN MARCH 2005.
Pontis	08/09/2005	G	JRS PROJECT #F-373(2) PROP "C" DATED 1960 FROM AS BUILT PLANS, FOOTING THICKNESS. BENT 3, PIER 2- STRUCTURAL FOOTING 5.5'. BENT 4, PIER 3- STRUCTURAL FOOTING 5.5'+ SEAL FOOTING 18.88' = 24.38'. PIER 3 FOOTING ELEV. TOP = 106.70 BOTTOM = 82.32'. PIERS 4,6,7 AND 8 HAVE 5' THICK STRUCTURAL FOOTINGS. PIER 5 HAS 8 DRILL SHAFTS,4 PER SIDE.
Pontis	02/01/2006	S	DLP SINCE COUNTERMEASURES HAVE BEEN INSTALLED, THIS STRUCTURE IS NO LONGER SCOUR CRITICAL. THE RIPRAP PLACED AT PIER #5 SHOULD BE MONITORED DURING UNDERWATER INSPECTIONS. IF THE RIPRAP BECOMES DISPLACED OR WASHED AWAY, THE BRIDGE SCOUR SECTION SHOULD BE NOTIFIED.

Figure 55: BI-13 Form - General Narrative

INTRODUCTION

The purpose of this form is to provide a place to record any narrative information that is not otherwise covered by a numbered item. This narrative information may include particular items to look for in subsequent inspections, or virtually any information that cannot be recorded in any other format. This feature will be used to develop a narrative "history" of each structure. It also provides a place to record additional information concerning certain numbered items. Item 210 (CPMS Reference Number) is an example of such an item.

Each time a new general narrative comment is required, a new comment is added. Existing comments may be edited to correct mistakes. Comments should only be deleted if accidently entered for the wrong structure. In this fashion many comments for each structure will be placed in the General Narrative Screen producing a narrative history of the structure.

USER ID

This item identifies the User ID of the individual making the narrative comments.

DATE

The date (month, day and four digit year) the event occurred which the narrative comments describe is entered in this space.

TYPE

This item identifies the note type. This field contains the parameters listed below:

Code	Description
A	Audit
E	EBIT
G	General
P	Program
R	Rating
S	Scour

COMMENTS

The narrative comments are entered in this space. As many lines as needed can be used to enter the pertinent remarks.

CHAPTER 10: UNDERWATER INSPECTION OF BRIDGES

The importance of underwater inspection of bridges can be readily appreciated if one considers the fact that at this writing approximately 86% of the bridges in the National Bridge Inventory (NBI) are built over waterways, and most bridge failures occur because of underwater related problems. The catastrophic consequences of bridge failures can be avoided if a conscientious and comprehensive bridge inspection program is organized and implemented. Underwater inspection is an integral part of such a program and bridge members underwater must be examined to the extent necessary to determine with reasonable certainty that their current conditions do not compromise the structural integrity of the bridge. The collapse of the U.S. Route 43 Bridge over the Chickasawbogue near Mobile, Alabama prompted the Federal Highway Administration (FHWA) to stress the importance of periodic underwater inspection and to order that each state have a well-founded underwater inspection program.

ESTABLISHING AN UNDERWATER INSPECTION PROGRAM

Identification of Bridges for Underwater Inspection. The National Bridge Inspection Standards (NBIS) require that all bridges with substructures located in water receive periodic inspections of the submerged elements. For any given bridge, the combination of environmental conditions and substructure configurations can significantly affect inspection frequency and requirements. Since there are many such combinations, it is important to review periodically and comprehensively all bridges in the Agency's inventory to determine which bridges require underwater inspection and when. A bridge management system certainly plays a crucial role in identifying inspection needs, selecting bridges to be investigated, setting priority, and scheduling the inspection activities. Criteria and rationale for determining which bridge requires underwater inspection, the inspection techniques to be used for various situations, the maximum inspection frequency for each bridge, documentation of underwater inspection results, and follow-up actions to correct any deficiencies identified are some important elements of a well-founded bridge inspection program.

Criteria to Determine if Underwater Inspection is Needed. In Alabama, the criteria for such determination is as follows: if the Bridge Inspector cannot physically examine any underwater substructure by feeling with his hands or probing during low-water seasons of the year, and to his satisfaction that no damage or unsafe condition exists, then that structure requires an underwater inspection by a diver-inspector. Normally, water less than three feet deep should be safe for a bridge inspection team to make an adequate underwater inspection.

The following information is usually included as a minimum for each bridge structure requiring underwater inspection:

a. Type and location of the bridge.
b. Type and frequency of required inspection.
c. Locations of members to be inspected.
d. Types and water depth of members.

e. Inspection procedures to be used.
f. Dates of previous inspections.
g. Special equipment required.
h. Results and findings of the last inspection.
i. BI-9 completed for each underwater inspection.
j. Follow-up actions taken based on the previous BI-9 forms.

Frequency of Inspection. The AASHTO Manual for Maintenance Inspection of Bridges specifies that routine, scheduled inspections of substructures submerged in water which are in excellent condition must be conducted at least once every five years. Structures having underwater members in damaged or deteriorated condition or which are located in unstable channels require shorter inspection intervals. The AASHTO Manual for Maintenance Inspection of Bridges further requires that steel substructures located in corrosive environments be inspected at least once every two years.

In Alabama, all state owned bridges requiring underwater inspection are inspected on a two-year cycle except for the structures shown in Appendix J. County and city bridges requiring underwater inspection are inspected once every four years. If any conditions exist which raise serious questions as to the structural integrity of an underwater element, that structure will require an underwater inspection regardless of the last inspection date. The Maintenance Bureau further stipulates that each Area will "mark or tab" the file of each structure that requires underwater inspection. Each Area is required to maintain an up-to-date list of all structures requiring underwater inspection, along with the date of the last underwater inspection.

Sometimes certain events and conditions affecting a bridge require that non-scheduled inspections of bridges be made to meet the urgency of the contingencies. These include, but are not limited to, the following:

a. Unusual floods. Major floods may threaten bridge foundation integrity.

b. Vessel impact. Inspect underwater bridge elements and determine the extent of damage.

c. Unusual ice floes. Accumulations of ice floes on substructure elements can increase the depth of scour and cause damage to the elements.

d. Prop wash from vessels. Turbulence caused by marine vessels may generate scouring currents damaging to underwater structures.

e. Build-up of debris at piers or abutments. This build-up effectively widens the element and maycause scouring currents.

f. Evidence of deterioration or movement. Investigate underwater elements if the bridge exhibits evidence of rotational, lateral, or vertical movement.

g. Adverse environmental conditions. Water with high concentrations of pollutants may cause rapid and severe deterioration of underwater elements.

h. Critical location in highway system. Structures whose loss may cause significant economic damage to the community warrant more frequent inspections regardless of their existing conditions.

<u>Underwater Inspection</u>. Three levels of inspection are identified and adopted by the Federal Highway Administration. The levels of inspection are indicative of the effort required for various inspections and provide a standard inspection terminology.

Level I Inspection. A Level I inspection involves close visual examination, or a tactile examination using large sweeping motions of the hands where visibility is limited. Level I examination is usually conducted over the total exterior surface of each underwater structure element. It must be detailed enough to detect major damage or deteriorations due to overstress, corrosion, or scouring, and confirm the continuity of the full length of all members.

Level II Inspection. A Level II inspection is a detailed examination of underwater structures which requires that portions of the structures be cleaned of marine growth. It is intended to detect damaged areas which may be hidden by surface biofouling. The selection of the locations for cleaning is made in such a way that it minimizes damage to the structures. The extent and severity of all damaged areas should be measured and documented.

Level III Inspection. A Level III inspection is a highly detailed examination of critical structural elements, or a member where extensive repair or replacement is contemplated. It is intended to detect interior damage and to evaluate material homogeneity.

<u>Frequency and Types of Inspection</u>. Bridge structures in excellent condition and located in passive, nonthreatening environments must receive routine underwater inspection at least once every five years. A *routine inspection* includes a Level I inspection of all underwater elements, a Level II inspection of at least 10 percent of the substructure elements, and a basic scour investigation. A scour investigation includes a complete evaluation of the adjacent stream bed, and determination of the channel profile in the area of the bridge.

An *in-depth inspection* typically includes Level II inspection over extensive areas and Level III inspection over limited areas. Nondestructive testing is normally performed, however, occasionally the inspection may include some destructive testing such as extracting samples for laboratory analysis and testing, and boring and probing.

Estimated percentages of Level I, II, and III inspection done by the Alabama Department of Transportation divers every two years are as follows:

Level of Inspection	Percentage of total
Level I	100%
Level II	40%
Level III	10%

Inspection levels are determined by the bridge inspectors after reviewing bridge files.

THE UNDERWATER INSPECTOR

This section discusses the attributes desirable in an underwater bridge inspector and the environment under which he will operate. The person in charge of the State's bridge inspection program is responsible for establishing the minimum qualifications for a diver-inspector who will be conducting underwater bridge inspection.

Conditions and Difficulties. Once a diver enters the water, his environment changes completely. His visibility is often reduced to near zero due to muddy water and depth. In many cases artificial lighting is ineffective because suspended particles in the water reflect the light. The diver must therefore rely on his sense of "feel" as opposed to his sense of "sight." The diver not only has reduced perceptual capabilities, but is less mobile as well. This cold, dark, hostile environment results in a reduced physical working capacity. The diver is also totally dependent on external life support systems which adds psychological stress. Things that can be done intuitively above water must be conscientiously planned and executed step-by-step underwater. For example, maintaining your orientation and location during an inspection requires continual attention. Distractions are plentiful and range from living organisms such as fish, snakes and crustaceans to environment conditions such as cold, high current and debris.

Qualifications. The underwater inspector, preferably, should possess the following desirable attributes and characteristics:

a. Dedication to do a good job and an appreciation of the importance of his work to the safety of lives and property
b. An experienced and accomplished commercial diver
c. Excellent physical and psychological condition
d. A determined and resilient spirit
e. Fully qualified and certified as an NBIS bridge inspector
f. Good communication skills
g. Diving certification for surface supplied air
h. Current CPR and First Aid certification
i. Current physical examination on record
j. Current Department annual training

Training. In 2005 the NBIS specified that the minimum training for a diver to perform underwater inspections was the attendance of the NHI Underwater Bridge Inspection Training course (NHI 130091). Additional and ongoing training is required for ALDOT Divers. These requirements are established by the State's bridge maintenance engineer. Basic credentials of a prospective inspector-diver may include technician certification in related technologies, a degree in engineering or engineering technology, plus experience in bridge inspection and diving. Because of the complexities of modern bridge structures, the intricacies of underwater inspection, and the adverse environment under which bridge inspection is normally conducted, each inspector-diver should participate in a continuing training program including a comprehensive bridge inspection training course with a minimum duration of two weeks. Short refresher courses or updated training sessions conducted periodically will be highly beneficial to the continuing professional development of the inspector-divers.

Graduates of commercial diving schools are generally better prepared for the diving conditions encountered in underwater inspection. Programs offered by organizations such as YMCA and the Professional

Association of Diving Instructors (PADI) are oriented towards the recreational diver and do not prepare an individual adequately for diving in the severe underwater conditions encountered near bridges.

In addition to on-the-job training under the supervision of an experienced bridge inspector-diver, a novice inspector-diver must take advantage of refresher courses or updated training offered periodically to maintain or improve their competency.

Safety. The ALDOT Bridge Maintenance Section has written a Safe Practices and Procedures Manual for its Underwater Bridge Inspection operations. It is a combination of standards and procedures from various publications including: OSHA, Commercial Diving Standards, Coastguard Commercial Diving Standards, U. S. Navy Diving Manual, U. S. Corp of Engineers Safety and Health Requirements Manual and the Association of Diving Contractors International Safe Practices and Procedures Manual. Refer to this manual for in-depth questions about the ALDOT Underwater Bridge Inspection practices.

Management of Diving Personnel. In view of the hazardous environment under which a bridge inspector-diver operates, the diving supervisor must ensure that proper precautions are being taken to safeguard against or minimize the many hazards associated with this profession such as decompression sickness, marine animals and plants, infections from water-borne microorganisms, chemical pollutants, and other known hazards connected with diving.

Minimum requirements of personnel for an underwater inspection are: one diver/supervisor, one standby diver/tender, and one topside inspector. In addition, at least one of these people must be an NBIS-certified bridge inspector.

UNDERWATER STRUCTURAL DEFECTS

The principal causes of underwater bridge defects are deterioration of the structural materials, damages due to vessel impact, and the undermining and loss of lateral and vertical soil support due to scour. The Underwater Inspection Field Reference found in Appendix F can help the inspector-diver to locate and identify structural defects.

Deterioration of structural material is caused by environmental factors and the quality, characteristics and properties of the material itself. For instance, steel structures submerged in salty or acidic water will eventually corrode, especially if protective measures are not being taken to prevent rusting. Timber piles in water will eventually decay or be attacked by marine borers.

On navigable waterways, bridges are also subject to damage by marine vessel impact. The damage may be visible above water, but an underwater inspection is often the only way to determine with certainty the overall structural integrity of the damaged structure.

Loss of lateral support and undermining due to streambed scouring have been a major cause of bridge failures, and they are usually not detected until they have reached very serious, even disastrous, proportions. There are, however, several ways to check the streambed conditions to forestall the sudden onset of such catastrophe. The most common methods are taking soundings to map the stream profile and underwater inspection.

<u>Types of Substructures Located in Water</u>. The common types of substructures located in water are pile bents, piers, abutments, cofferdams, culverts, and protective devices such as dolphins, fenders, and shear fences. The discussions that follow serve to highlight the salient features of each structure.

Pile Bents. Pile bents are structural supports consisting of piles and pile caps. Superstructure loads are distributed to the piles by the pile cap. Pile bents are used as both intermediate supports and abutments. They are usually constructed of timber, concrete, steel, or a combination of these materials. Some older structures made extensive use of stone masonry.

Piers. Piers are transverse intermediate supports constructed of concrete, masonry, timber, or steel. A pier consists of three basic elements: a footing, a shaft, and a pier cap. Some representative pier types are shown in Figure 56.

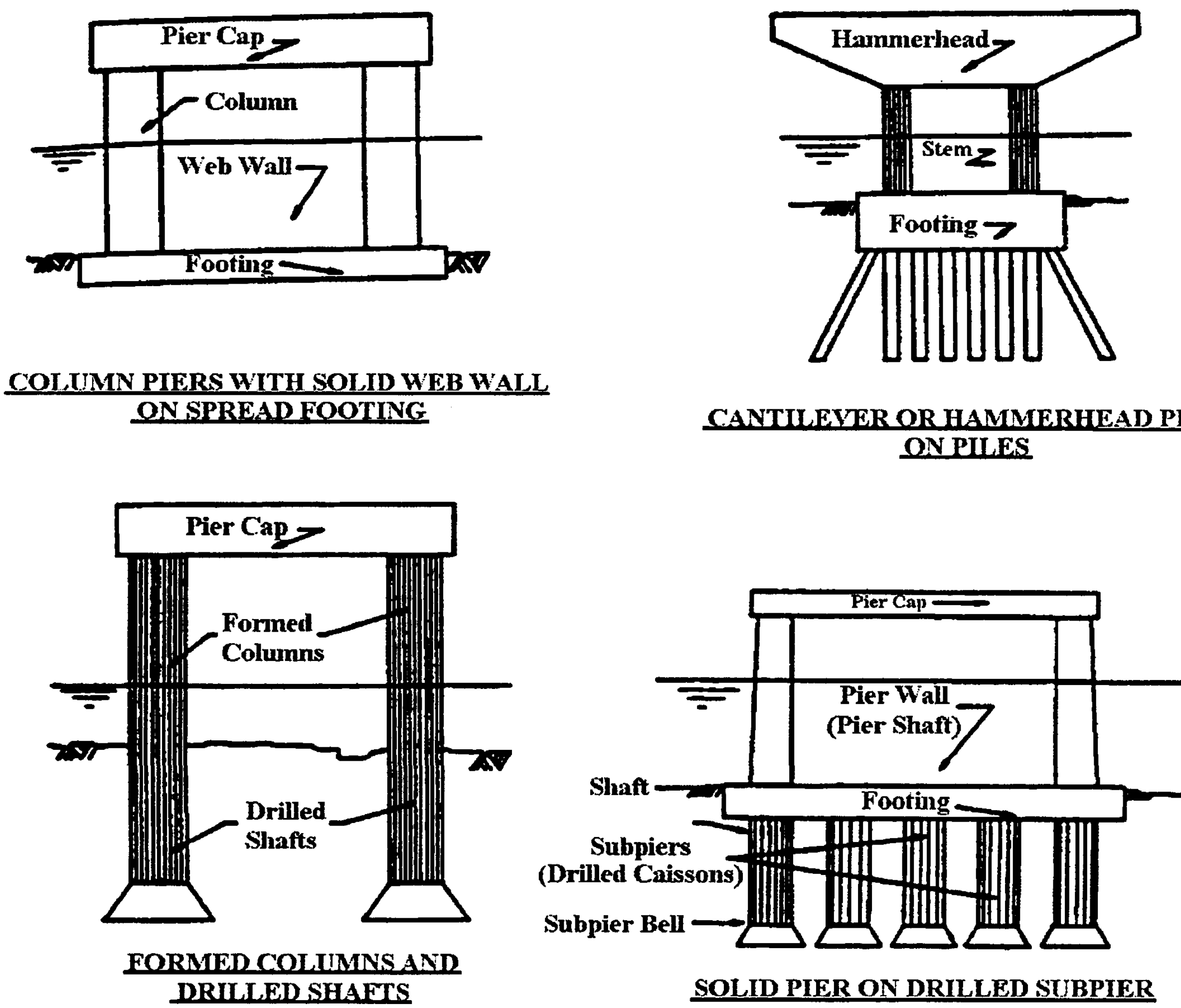


Figure 56: Representative Pier Types

Abutments. Abutments are substructure elements at the ends of bridges. They provide end support for a bridge, and retain the approach embankment. Types of abutments include Full Height, Stub, and Open. These are shown in Figure 57.

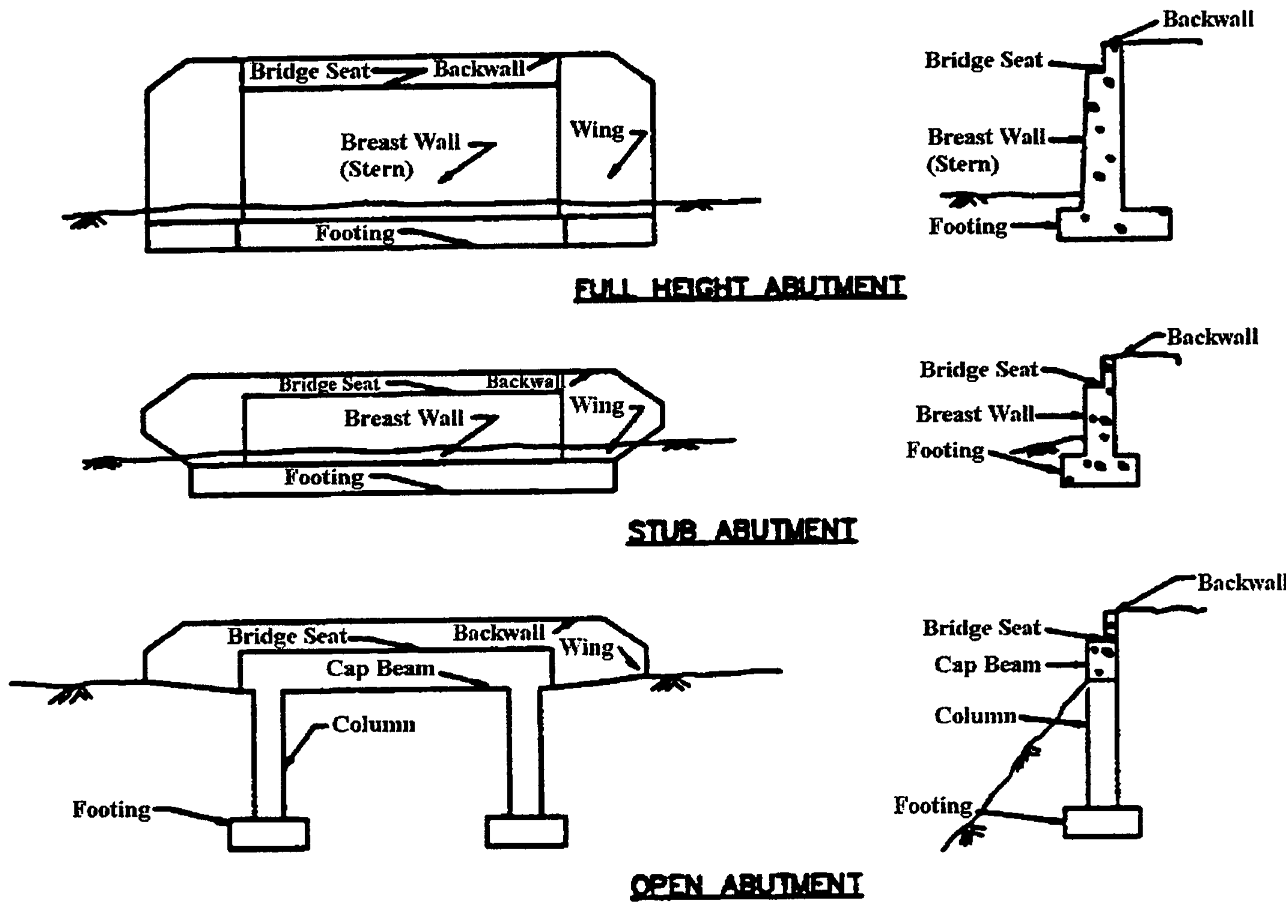


Figure 57: Types of Abutment

Cofferdams. A cofferdam is a temporary enclosure used to build a pier's foundation. It is usually constructed of steel sheet piles. After the sheets are driven and an underwater inspection is made, a seal footing of concrete is poured on the bottom. The cell is then de-watered and a pier built on the seal.

Protective Devices. Dolphins, fenders, and shear fences are examples of protective devices placed around bridge substructures to protect them from serious damage by errant impacting vessels. Dolphins are constructed of a group of timber or steel piles or steel sheet pilings driven into the channel bottom to form a protective layer around the structure. A fender system is usually attached directly to the substructure unit, or to piles driven adjacent to the substructure unit. Shear fences are extensions of a fender system consisting of a series of piles supporting walers.

Culvert. A culvert is a small bridge normally constructed entirely below the elevation of the roadway surface and having no part integral with the roadway.

Deterioration of Structural Materials. Four types of structural materials will be discussed; concrete, steel, masonry, and timber. Emphasis will be placed on the common causes of damage and deterioration, and how to identify, evaluate, and document these defects in a systematic manner.

Concrete. Three types of concrete are generally used for construction purposes: plain, reinforced, and prestressed. Concrete is susceptible to deteriorations caused by a variety of environmental factors. These deteriorations are usually manifested in the forms of cracking, scaling, and spalling. Additionally, concrete may be damaged by abrasion and vessel impact. Minor abrasion damage resembles scaling, while major abrasion damage may cause gouges, cracks, and voids.

Cracks can develop due to volume changes caused by temperature variation. Cracks may also be an indication of overloading, corrosion of the reinforcing steel, or settlement of the structure. Cracks can be found at any location on a substructure element. When reporting cracks, record the length, width, location, and orientation (horizontal, vertical, diagonal, etc.) of each crack. Also indicate the presence of rust stains, efflorescence, or evidence of differential movement on either side of the crack.

Scaling is a gradual and continuous loss of surface mortar and aggregate from an area. This condition is commonly found at the waterline on piers and piles in colder climates and is caused by volume changes due to freeze-thaw action. It can also be caused by chemical attack from pollutants in water. When reporting scaling, note the location, size, and depth of penetration of the scaling. To avoid confusion when reporting defects, a standard format and nomenclature should be used consistently.

Spalling is a depression in the surface of the concrete which may expose corroded reinforcing steel. This defect is commonly found at the waterline of bridges, where the combined actions of salt water, acidic pollutants, and waves provide a conducive environment for spalling. Cracks and pores in concrete allow moisture and air to reach reinforcing steel bars near the surface which subsequently corrodes the steel. When steel corrodes, the products of corrosion can occupy up to ten times the volume of the parent material and may produce forces in excess of 34 psi. This expansive force cracks the concrete and "pop-off" areas are created on the surface of the concrete.

When inspecting concrete substructures for presence of spalling, look for signs of defects above and in the area of the waterline. Strike the surface with a hammer to determine if there are fracture planes hidden below the surface of the concrete. Pay particular attention to areas that are intermittently wet and dry. Below the water surface, areas adjacent to construction accessories should be closely examined.

Steel. The primary cause of damage to steel is corrosion. Corrosion is most prevalent in the splash and tidal zones, and can occur both above and below water. Corrosion can be especially severe when the bridge is located in salt and brackish water or water laden with chemical pollutants. Corrosion rates may also be worsened by the presence of stray electrical current, high velocity flow, and warm water temperature.

When reporting steel corrosion, check the coatings for breaks which are potential areas of corrosion. Detailed examination of the coatings should be made with care so as not to damage any coating which is present. Also check underwater connections for corrosion at splices in piles, at bracing connections, and on wales of sheet pile bulkheads. Corrosion may also be present in the bracing member connections in the splash zone. Connections are potential sites of corrosion because their composition may be different from the structure's main material, causing the formation of galvanic corrosion cells at these discontinuities.

Examine bolts, nuts, and rivets for corrosion and fit, and check the interlocks on sheet piling for cracks, corrosion, and gaps between sheets.

Masonry. Many older bridges have piers and abutments constructed of masonry. The types of stone commonly used are granite, limestone, and sandstone. Problems prevalent in masonry structures include cracking, scaling, and deteriorated pointing.

Masonry is a naturally porous material and is susceptible to deterioration by freezing and thawing. The stone may fracture and break off in small pieces, and the man-made mortar deteriorates like concrete. Masonry-mortar joints near the waterline are most susceptible to this type of damage. The abrasive action of sand in water may cause underwater masonry to experience losses in both the masonry and the pointing. Record the location, length, width, and penetration of defects in areas of deterioration.

Timber. Timber pile bents are common in smaller and shorter span bridges. On larger bridges, many protection devices are constructed of timber, and many piers and abutments are supported on timber piles. Deterioration in timber members results from a variety of factors, including the decaying action of bacteria and fungus, marine infestations, abrasion damage, and damage from vessel impact. Other damage may be caused by construction defects and faulty or missing connectors.

UNDERWATER INSPECTION EQUIPMENT

The Diver's Environment. The diver's work environment is inherently hostile and hazardous. He often works in isolation, in cold, dark places under severe physiological and psychological stress, and is exposed to a variety of pressure-decompression related illnesses and injuries. To work effectively, the diver must adapt to his environment, be familiar with his equipment, and select methods appropriate to the task.

Common physiological hazards include decompression sickness, nitrogen narcosis, carbon dioxide poisoning, and oxygen poisoning. Because of the potential for nitrogen narcosis and oxygen poisoning when breathing air under high pressure, mixed gas, generally a helium-oxygen mixture, is used for deep dives, generally 190 feet or greater. Most bridge inspections are conducted at depths where air can be used. For this reason, air diving is the only type discussed in details in the following sections.

Modes of Diving. Within air diving, two principal modes are used: scuba, in which the diver carries his own air supply with him in a tank; and surface-supplied diving, in which the diver's air source comes from ship-based or shore-based equipment. Both modes are used by ALDOT underwater bridge inspectors. However, surface-supplied is the preferred method because of its safety and efficiency.

Scuba Diving. Scuba is an acronym for Self Contained Underwater Breathing Apparatus. It utilizes high pressure steel or aluminum air cylinders with two-stage regulators to deliver air to the diver. Due to the dangerous conditions encountered in underwater bridge inspections, (debris, low or zero visibility, cold, swift water and other physiological dangers) scuba is used only in a very limited application by the ALDOT underwater inspection teams.

Surface-Supplied Diving. In a surface-supplied system, air is supplied to a helmet worn by the diver through an air umbilical. The air supply can be either a compressor or a bank of high pressure bottles. The umbilical consists of an air hose, communication wire, pneumofathometer hose, and a safety line. The communication wire runs from a two-way radio on the surface to a speaker and microphone in the diver's helmet. The pneumofathometer runs from a calibrated depth gauge on the surface, to the diver, enabling the inspection team to get a depth reading whenever necessary. With this system the diver has a constant supply of air and the ability to communicate with the surface, thus providing assistance in an emergency and a more thorough bridge inspection.

Additional support equipment for both modes of air diving could include a decompression chamber, which is required for dives exceeding 100 fsw (feet of seawater) or which exceed the no-decompression limits.

Diver's Equipment. The following is a list of essential dive gear needed to conduct surface-supplied and scuba operations. (An explanation follows each item).

1. Exposure Suits: A diver immersed in cold water rapidly loses body heat. To protect and insulate the diver, an exposure suit is necessary. There are two types of exposure suits in common use: the wet suit and the variable-volume dry suit. A wet suit allows a thin layer of water between the suit and the diver's skin, which acts as an insulator to keep the diver warm. The suit will provide adequate thermal protection in warmer waters, generally above 50 degrees Fahrenheit. In cold or polluted waters, the variable-volume dry suit is extremely effective in keeping the diver warm and guarding against water-borne pollutants. The suit is designed to use a layer of air as insulation and can normally be inflated from a low pressure air supply. It is to be worn with thermal underwear which provides excellent protection against cold.
2. Air Cylinders: Used to hold compressed air.
3. Regulators: Reduces and regulates air pressure coming from high pressure air cylinders to divers.
4. Buoyancy Compensator (BC): System of rubberized air bags which allows the diver to maintain neutral buoyancy at depth or a face-up position on the surface without having to tread water.
5. Face Mask: Protects diver's nose and eyes from water.
6. Weight Belt: Helps control buoyancy.
7. Fins: Increases swimming efficiency.
8. Knife: Used primarily as a tool and is available for emergencies. It is usually made of stainless steel with a serrated edge and a marlin spike.
9. Depth Gauge: Used to determine water depth.
10. Pneumofathometer: Used to determine water depth, also can be used as emergency air source.
11. Submersible Pressure Gauge: Provides diver with continuous indication of amount of air in scuba cylinder.
12. Wristwatch: Keeps track of "Bottom Time" and "Surface Intervals".
13. Dive Helmet: Provides dry protective environment for divers head.
14. Diver Umbilical: Air, communication, and life line from surface to diver.
15. Harness: Nylon web with attached "D" rings for securing umbilical and tools to diver.
16. Two-Way Diver Radio: Used for audio communication between diver and topside personnel.
17. Compressor: Supplies air to diver via air cylinders or volume tank with filters.
18. Volume Tank: Storage area for air supply (must be equipped with filters).
19. Power Head: Explosive device used to protect diver from hostile marine animals.
20. Gloves: Used to protect divers' hands for cold and/or abrasions.

21. Bail out Bottle: Compressed air cylinder carried with diver for emergency air supply.
22. Diving Console: Portable one or two diver control station that regulates or monitors divers' air supply, communications and depth.

Inspection Tools. Much of the underwater inspection work involves cleaning of structural elements. Sampling and testing may also have to be done. Hence the diver must have the proper tools and equipment to work effectively underwater. Both power and hand tools are used underwater. Under normal circumstances, hand tools are used unless the biofouling is extremely severe and difficult to remove or the areas to be cleaned are extensive. For underwater repair work, use of power tools would be warranted.

Typical *hand tools* used for underwater inspection work include screwdrivers, scrapers, ice picks, hammers, axes, hand drills, wire brushes, pry bars, flashlights, and hand saws. *Power tools* come in two types: hydraulic and pneumatic. Pneumatic tools can be used underwater; however, they are costly to operate and maintain due to water intrusion. They also produce a stream of bubbles that can interfere with the diver. Hydraulic tools use a closed fluid system which does not produce bubble interference and enable the diver to use them more efficiently and with less fatigue.

Underwater Photography and Video Equipment. Significant improvements in underwater camera and video equipment mean that underwater documentation in the form of color photography or video can now be provided at an economical cost under almost all water conditions. Both still and video camera play an important role in identifying and reporting underwater structural defects.

Due to advancements of underwater video systems ALDOT divers use digital recording devises for the bulk of their underwater recordings.

Some useful tips for underwater photography are discussed below:

1. Document conditions with underwater photography as the inspection progresses, rather than waiting until the end of the project to take pictures.
2. Always use artificial light sources to obtain true color reproduction without loss of details and contrast.
3. In reviewing photographs of underwater objects, it is often difficult to determine the size and true color or tint of objects without some standard of reference. To provide a basis of reference, include a scale and a patch of known color in the photograph.
4. When the water is extremely turbid and visibility exceptionally low, a "clearwater" box may be used to obtain a clear picture. A "clearwater" box is a box constructed of clear plastic that can be filled with clear water through which a camera is aimed. The box, when pressed against a subject, displaces the turbid water. Use of the "clearwater" box normally requires two divers.

Dive Platforms. In bridge inspection, the primary dive platform is typically a boat. A key criterion in choosing a boat is adequate space for all dive equipment and personnel. The international dive flag "ALPHA," a blue and white flag, must be displayed to comply with international standards. Since recreational boaters may not recognize this dive flag, both this flag and the red and white sport diver flag should generally be flown for safety.

UNDERWATER INSPECTION TECHNIQUES

Preparation and Safety. Preparation for underwater inspection includes:

1. Site reconnaissance and datacollection.
2. Reviews of as-built drawings and previous reports.
3. Selection of equipment andmethods.

During site reconnaissance, the diving supervisor and inspector:

1. Determine the number of substructure units in water .
2. Estimate those units which can be inspected by wading and those which require diving.
3. Determine the approximate water depth from the drawings or using a weighted lead line.
4. Determine the approximate velocity of the water.

By previewing as-built drawings of substructure units to be inspected, the diver can learn what he may encounter underwater. It will also facilitate communication between the diver and note-taker. Previous reports provide a basis of comparison between the conditions of the defects existing then and those encountered now. Information obtained from site reconnaissance and previous reports help a dive team to select the most efficient and effective methods and equipment.

Inspection Procedures. Inspection procedures of piers, abutments, piles, cells, cofferdams, and bulkheads will be briefly discussed.

Piers are inspected in a circular pattern using visual and tactile methods. The inspection is started by making a circular path around the base of the pier, then moving up a uniform increment, and circling the pier again. This pattern is repeated until the inspection is completed.

For a surface-supplied air diver, the pier cannot be circled without entangling the line. In such case, the diver inspects one side of the pier in a back and forth motion starting at the bottom. Repeat this pattern on the other side of the pier. Abutments are inspected using the same back and forth method.

Piles are inspected in a spiral motion. The diver begins at the top of one pile and inspects it while descending, then moves to the next pile and inspects it while ascending. When the inspector is line-tendered or using surface-supplied equipment, he must move from side to side to keep the line free.

The inspection procedure for cells, cofferdams, and bulkheads is similar to that of piers. The inspector also notes the presence, size, and condition of any riprap placed at the base of these units, and any indication of scour.

Level III Examination–Special Testing. Level III examination is employed when Level I and Level II examinations cannot conclusively determine the structural condition of the underwater item. Special testing of steel, concrete, and timber structures will be discussed.

Steel. In steel structures, the inspector is often interested in measuring the remaining thickness of corroded members. This can be done with a graduated scale, a pair of calipers, and ultrasonic measuring devices. To detect hidden flaws, magnetic particle testing and radiography may be used.

A graduated scale is the most basic tool for measuring exposed surfaces and edges. However, it is not very precise and should be used only for approximate measurements.

Calipers are compact and easy to use under most circumstances. A disadvantage, however, is that they cannot take direct measurements of sheet piling or webs of H-piles, unless holes are drilled in the member.

Ultrasonic devices measure thickness by sending high frequency sound waves through a member, and then measuring the travel time of the waves and calculating the thickness of the member. Two types of ultrasonic devices are available. One type is totally submersible, and the second type has a waterproof transducer and cable which are carried below water while the electronics and display unit remain on the surface.

Both magnetic particle testing methods and radiography are not commonly used for underwater bridge inspection and will not be discussed here.

Concrete. Several nondestructive tests can be performed on concrete using specialized instruments, but these instruments will have to be modified for underwater use.

The V-meter is an ultrasonic testing device which can determine locations of discontinuities in the concrete, such as cracks and voids, by detecting abnormal velocities of travel of high frequency sound waves. Data is then interpreted by trained technicians.

The Schmidt hammer is a mechanical device which measures the compressive strength of in-place concrete.

The R-meter can determine the location of reinforcing steel within concrete and measure its depth of cover and size. The meter accomplishes this by inducing a magnetic field within the concrete.

Coring is a partially destructive testing method. Cores obtained underwater can be tested in the laboratory in accordance with standard procedures. Voids created by coring will need to be filled and repaired.

Timber. Level III special testing methods for timber include:

1. Estimation of residual strength of timber by nondestructive ultrasonic testing
2. Partially destructive testing of timber by coring and boring with hand, pneumatic, or hydraulic tools
3. Boring a hole in the timber and probing the inside with a thin, hooked rod to determine if there are voids due to decay or marine borers. Every underwater inspection of timber piles should include representative measurements of the pile diameter. Losses of timber section due to abrasion, decay, or vermin attack may not be readily detected by visual means alone. Voids or holes created by boring may need to be filled by driving dowels or shaped pieces of hardwood into the holes.

SCOUR INVESTIGATIONS

The most common cause of bridge failures stems from floods, and scouring of bottom material around bridge foundations is the most common cause of damage to bridges during floods. Therefore, periodic scour investigations should be conducted for each bridge to determine if a bridge is scour critical. A scour critical bridge is one with abutment or pier foundations rated as unstable due to observed scour at the bridge site or a scour potential as determined from a scour evaluation study.

Basic Concepts. Scour is the result of the erosive action of flowing water. Water flowing at high speed tends to be more erosive than low-velocity flows. Different materials scour at different rates. For instance, loose granular soils are rapidly eroded by underwater action while cohesive or cemented soils are more scour resistant. Scour will reach its maximum depth in sand and gravel beds in hours, cohesive materials in days, glacial tills, sandstones and shales in months, limestones in years, and dense granites in centuries. Inspectors need to carefully study site-specific information in evaluating scour potential at bridges.

Types of Scour. *General* scour involves the removal of material from the stream bed and banks across all or most of the width of a channel. It can result from a contraction of the flow area or channel width and changes in downstream water surface elevation which controls the backwater and hence, the velocity through the bridge opening. It can also result from the location of the bridge in relation to a bend. In each case, the scour is caused by increased velocities and increased bed shear stresses. *Contraction* scour is a form of general scour caused by contraction of the flow area (or channel width) and an increase in flow velocities.
Local scour also involves removal of material from the channel bed or banks but is restricted to a minor part of the channel. This scour occurs around piers, abutments, spurs, and embankments. It is caused by an acceleration of the water flow rate around the base of these structures and the subsequent development of a vortex induced by their obstructions to the flow. As the depth of scour is increased, the strength of the vortex decreases and the transport rate of sediment is reduced. Eventually an equilibrium condition is reestablished and scouring ceases. Factors affecting local scour are:

1. Pier width
2. Projected length of the abutment into the flow
3. Pier length
4. Depth of flow
5. Velocity ofthe approach flow
6. Bed material
7. Angle of attack of the approach flow to the pier or abutment
8. Geometric shapes of the pier and abutment
9. Ice formations or jams
10. Channel bed configuration
11. Debris.

Evaluating Scour Potential of Bridges. Bridges are inspected to determine, among other things, their existing scour conditions and their vulnerability to scour damage. This assessment should be done by an interdisciplinary team of professional engineers who can make the necessary engineering judgments to decide:

1. Priorities for making bridge scour evaluations
2. The scope of the scour evaluations

3. Whether the bridge is scour critical
4. Which scour countermeasure to adopt
5. Which countermeasure is most suitable and cost-effective for a given bridge
6. Inspection and monitoring schedules for scour critical bridges.

The Evaluation Process. The major objectives of a scour evaluation program are elaborated as follows:

1. To review all bridges susceptible to scour in the State's bridge inventory
2. To determine those foundations which are stable for estimated scour conditions and those which are not
3. To provide for frequent inspection of scour critical bridges during and after flood events until adequate scour countermeasures are implemented
4. To install scour countermeasures in a timely manner.

Five steps are identified in the scour evaluation process. These steps are discussed individually as follows:

Step 1. Compile a list of those bridges with actual or potential scour problems. This list will likely include:

a. Those bridges currently experiencing scour and those that have a history of scour problems
b. Bridges over streams with erodible beds or bridges with design features that make them vulnerable to scour
c. Bridges on "aggressive" streams including those with active streambed degradation or aggradation, those with significant lateral movement, and those with steep slopes or high flow velocities
d. Bridges located on stream reaches with adverse flow characteristics.

Step 2. Prioritize the list compiled in Step 1, using the following factors as a guide:

a. The potential for bridge collapse or damage in the event of a major flood
b. The functional classification of the highway on which the bridge is located
c. The effects of a collapse on the safety of the travelling public
d. The effects of a collapse on the overall transportation system of the region.

Step 3. Conduct field and office scour investigations of the bridges on the prioritized list developed in Step 2, using a team of structural, hydraulic, and geotechnical engineers.

Step 4. For bridges identified as scour critical in Step 3, formulate a plan of action for monitoring and correcting the scour problems.

Step 5. After completing scour investigations for the list of bridges compiled in Step 1, the remaining bridges in the bridge inventory should be evaluated. Establish another list of bridges based on the following criteria:

a. Functional classification of the highway on which the bridge is located highest priority is given to arterial highways, and lowest to local roads.
b. Bridges whose failures could have a disastrous effect on regional traffic operations.

Diver's Inspection of Underwater Scour Conditions. Underwater scour inspection includes inspection of the scour status and scour potential of pile footing and abutment footing. The purpose is to determine the vulnerability of the bridge structures to scour damage.

Inspect for scour at piling and measure depth of scour. Footings which were designed to be embedded in the stream bed should be inspected for scour. Measure each exposed pile from the bottom of the footing to the mudline. Take photographs of the bottom of the footing showing exposed piles when possible. Also, note condition of piles and debris, if present. During an underwater inspection, the diver notes the bottom conditions adjacent to submerged foundation elements. Local scour can generally be identified by the presence of scour holes near the upstream end of the substructure unit and a build-up of soil at the downstream end. He should also note the presence of debris which could cause local scour.

Note the type of stream bed material and the presence, location, and size of riprap. The diver may be able to determine if riprap has been covered over by stream bed material by probing the suspected area with a steel rod.

Scour Investigations by Soundings. The most common instruments used to make soundings are recording fathometers, sounding poles, and weighted lines. Soundings may be taken from a boat to permit making measurements under the bridge and at distances upstream and downstream of the bridge. Soundings may also be taken with a weighted line by an inspector from the bridge deck and may be referenced to a part of the bridge structure, such as the top of the handrail or the curb. For more information on the requirements for this type of profiling see the BI-4 section of thismanual.

Recording Fathometer. This instrument is easy and compact to use and is perhaps the most efficient way of recording depths. It consists of a transducer, which is suspended in water, a sending/receiving device, and a graphic recorder. The fathometer measures the time it takes the emitted sound waves to return to the transducer and converts that time to depths of water, which is plotted or displayed on the graphic recorder. The fathometer provides a profile of the channel bottom. It also gives a good indication of scour activity at piers and abutments. Color fathometers are also available which provide a good representation of the channel bottom, including density variations of substrata materials. In certain types of soil, a color fathometer can even detect infilling of scour holes.

Geophysical Inspection of Scour. As a flood is receding, the stream velocity decreases resulting in the sediment being redeposited in the scour hole. This redisposition is referred to as infilling. Since infill material often has a different density than that of the adjacent unscoured channel bottom material, the true extent of scour can be measured by determining the interface where the density variation occurs.

Three geophysical tools which can be used to measure scour after infilling occurs are ground penetrating radar or sonar, tuned transducer, and color fathometer. Ground penetrating radar or sonar can be used to obtain high resolution, continuous, subsurface profiles on land or in relatively shallow water (less than 25 feet). This device transmits short (80 to 100 MHz) electromagnetic pulses into the subsurface and measures the return times of the signals and then converts them to a continuous subsurface profile.

Tuned transducer, or low frequency sonar, is a seismic system which operates through the transmission and reception of acoustic waves. It consists of a transmitter, a transducer towed alongside the boat, a receiver, and a graphic recorder.

A color fathometer is similar to a black and white recording fathometer, except that it provides a good representation of the channel bottom, including density variations of substrata materials.

SUMMARY

This section has outlined some of the important factors contributing to deterioration of underwater substructures, and the appropriate inspection techniques to identify and evaluate the damage. It also highlights the causes and mechanics of underwater scour and the importance of identifying scour critical bridges for follow-up remedies and countermeasures. Diving procedures, diver's equipment, and personnel requirements are also discussed to shed light on the important role played by the inspector-diver. A significant insight gleaned from this section is that no underwater structure is immune to deterioration of structural integrity; hence, the importance of a well-founded underwater inspection program.

It should be emphasized that this section is intended as an introduction and an overview of underwater bridge inspection and is not to be construed as an exhaustive and complete discussion of the subject. It does not substitute for attending any underwater bridge inspection training course conducted or offered by the Department.

Any questions regarding the structural soundness of underwater substructures should be addressed to the chief bridge inspector of the appropriate area office, and if they are not resolved there, to the Maintenance Bureau of the Department's Central Office.

CHAPTER 11: SCOUR

INTRODUCTION

The purpose of this section is to provide information for evaluating and inspecting bridges for scour. Information contained in this chapter was extracted from *FHWA Hydraulic Circular No. 18, Evaluating Scour at Bridges, Second Edition.*

BASIC CONCEPTS AND DEFINITIONS OF SCOUR

General. Scour is the result of the erosive action of flowing water, excavating and carrying away material from the bed and banks of streams. Different materials scour at different rates. Loose granular soils are rapidly eroded by flowing water, while cohesive or cemented soils are more scour resistant. *However, ultimate scour in cohesive or cemented soils can be as deep as scour in sand-bed streams.* Under constant flow conditions, scour will reach maximum depth in sand and gravel bed materials in hours; cohesive bed materials in days; glacial tills, sand stones and shales in months; limestones in years and dense granites in centuries. Under flow conditions more typical of actual bridge crossings, several floods will be needed to attain maximum scour.

Designers and inspectors need to carefully study site-specific subsurface information in evaluating scour potential at bridges, giving particular attention to foundations on rock. Massive rock formations with few discontinuities are highly resistant to scour during the lifetime of a typical bridge.

A factor in scour at highway crossings and encroachments is whether the scour is clear-water or live-bed scour. Clear-water scour occurs where there is no transport of bed material upstream of the crossing or encroachment and live-bed scour occurs where there is transport of bed material from the upstream reach into the crossing or encroachment.

This chapter discusses scour in both riverine and coastal areas. In riverine environments scour results from flow in one direction (downstream). In coastal areas, highways that cross streams and/or encroach longitudinally on them are subject to tidal fluctuation and scour results from flow in two directions. In waterways influenced by tidal fluctuations, flow velocities do not necessarily decrease as scour occurs and the waterway area increases. This is in sharp contrast to riverine waterways where the principle of flow continuity requires that velocity be inversely proportional to the waterway area.

TOTAL SCOUR

Total scour at a highway crossing is comprised of three components. These are:

1. Long-term aggradation and degradation.
2. Contraction scour, and
3. Local scour.

In addition, lateral migration of the stream must be assessed when evaluating total scour at piers and abutments of highway crossings.

Aggradation and Degradation. These are long-term streambed elevation changes due to natural or man-induced causes (commonly dredging or mining operations) which can affect the reach of river on which the bridge is located. Aggradation is the deposit of material eroded from the channel or watershed upstream of the bridge, whereas degradation is the lowering or scouring of the bed of a stream due to a deficit in sediment supply from upstream.

Contraction Scour. Contraction scour in a natural channel involves the removal of material from the bed and banks across all or most of the channel width. This component of scour can result from a contraction of the flow area or change in downstream control of the water surface elevation. The scour is the result of increased velocities and shear stress on the bed of the channel.

Contraction of the flow by bridge approach embankments encroaching onto the floodplain and/or into the main channel is the most common cause of contraction scour. Contraction scour can be either clear-water or live-bed. Live-bed contraction scour typically occurs during the rising stage of a runoff event, while refilling of the scour hole occurs during the falling stage. Also, clear-water scour at low or moderate flows can change to live-bed scour at high flows. This cyclic nature creates difficulties in measuring contraction scour after a flood event.

Local Scour. Local scour involves removal of material from around piers, abutments, spurs, and embankments. It is caused by an acceleration of flow and resulting vortices induced by the flow obstructions, and is usually cyclic in nature. Local scour can also be either clear-water or live-bed scour.

Lateral Stream Migration. In addition to the types of scour mentioned above, naturally occurring lateral migration of the main channel of a stream within a floodplain may increase pier scour, erode abutments or the approach roadway, or change the total scour by changing the flow angle of attack at abutments and piers. Factors that affect lateral stream movement also affect the stability of a bridge. These factors are the geomorphology of the stream, location of the crossing on the stream, flood characteristics, and the characteristics of the bed and bank materials. For additional information refer to *Hydraulic Engineering Circular No. 20, [8] and "Highways in the River Environment."*

The following paragraphs provide a more detailed discussion of the various components of total scour.

Aggradation and Degradation - Long-Term Streambed Elevation Changes. Long-term bed elevation changes may be the natural trend of the stream or may be the result of some modification to the stream or watershed. The streambed may be aggrading, degrading or in relative equilibrium in the vicinity of the bridge crossing. In this section long-term trends are considered. Long-term aggradation and degradation do not include the localized cutting and filling of the bed of the stream that might occur during a runoff event (contraction and local scour). A stream may cut and fill at specific locations during a runoff event and also have a long-term trend of an increase in the elevation over a reach of a stream. The problem for the engineer is to estimate the long-term bed elevation changes that will occur during the life of the structure.

A long-term trend may change during the life of the bridge. These long-term changes are the result of modifications to the stream or watershed. Such changes may be the result of natural processes or human activities. The engineer must assess the present state of the stream and watershed and then evaluate potential future changes in the river system. From this assessment, the long-term streambed changes, must be estimated.

Factors that affect long-term bed elevation changes are:

a. dams and reservoirs (upstream or downstream of the bridge),
b. changes in watershed land use (urbanization, deforestation, etc.),
c. channelization,
d. cutoffs of meander bends (natural or man-made),
e. changes in the downstream channel base level (control),
f. gravel mining from the streambed,
g. diversion of water into or out of the stream,
h. natural lowering of the total system,
i. movement of a bend,
j. bridge location with respect to stream planform,
k. and stream movement in relation to the crossing.

The Corps of Engineers and other agencies should be contacted concerning documented long-term streambed variations. If no documented data exist or if such data require further evaluation, an assessment of long-term streambed elevation changes for riverine streams should be made using the principles of river mechanics. With coastal streams the principals of both river and coastal engineering mechanics are needed. Such an assessment requires the consideration of all influences upon the bridge crossing; i.e., runoff from the watershed to a stream (hydrology), the sediment delivery to the channel (watershed erosion), the sediment transport capacity of a stream (hydraulics) and the response of a stream to these factors (geomorphology and river mechanics). In coastal streams, in addition to the above, consideration must be made of tidal conditions; i.e., the magnitude and period of the storm surge, the sediment delivery to the channel by the ebb and flow of the tide, littoral drift, the sediment transport capacity of the tidal flows and the response of the stream to these tidal and coastal engineering factors.

Significant morphologic impacts can result from human activities. The assessment of the impact of human activities requires a study of the history of the river, estuary, or tidal inlet, as well as a study of present water and land use and stream control activities. All agencies involved with the river or coastal area should be contacted to determine possible future changes in the river.

Contraction Scour. Contraction scour occurs when flow area of a stream at flood stage is reduced, either by a natural contraction or by a bridge and/or its approach embankments. From continuity, a decrease in flow area results in an increase in average velocity and bed shear stress through the contraction. Hence, there is an increase in erosive forces in the contraction and more bed material is removed from the contracted reach than is transported into the reach. This increase in elevation is lowered, the flow area increases and, in the riverine situation, the velocity and shear stress decrease until relative equilibrium is reached; i.e., the quantity of bed material that is transported into the reach is equal to that removed from the reach.

In coastal streams which are affected by tides, as the cross-section area increases the discharge from the ocean may increase and thus the velocity and shear stress may not decrease. Consequently, relative equilibrium may not be reached. Thus, at tidal inlets which experience clear-water or live-bed scour, contraction scour may result in a continual lowering of the bed (long-term degradation).

Contraction scour can also be caused by short-term (daily, weekly, yearly or seasonal) changes in the downstream water surface elevation that control backwater and hence, the velocity through the bridge opening. Because this scour is reversible, it is included in contraction scour rather than in long-term aggradation/degradation.

Contraction scour is typically cyclic. That is, the bed scours during the rising stage of a runoff event, and fills on the falling stage. The contraction of flow due to a bridge can be caused by either a natural decrease in flow area of the stream channel or by abutments projecting into the channel and/or the piers blocking a large portion of the flow area. Contraction can also be caused by the approaches to a bridge cutting off the floodplain flow. This can cause clear water scour on a setback portion of a bridge section and/or a relief bridge because the floodplain flow does not normally transport significant concentrations of bed material sediments. This clear-water picks up additional sediment from the bed upon reaching the bridge opening. In addition, local scour at abutments may well be greater due to the clear-water floodplain flow returning to the main channel at the end of the abutment.

Other factors that can cause contraction scour are:

a. natural stream constrictions,
b. long highway approaches over the floodplain to the bridge,
c. ice formation or jams,
d. natural berms along the banks due to sediment deposits,
e. island or bar formations upstream or downstream of the bridge opening,
f. debris or drift,
g. and the growth of vegetation in the channel or floodplain.

In a natural channel, the depth of flow is always greater on the outside of a bend. In fact there may well be deposition on the inner portion of the bend at the point bar. If a bridge is located on or close to a bend, the contraction scour will be concentrated on the outer part of the bend. Also, in bends the thalweg (the part of the stream where the flow is deepest and, typically, the velocity is the greatest) may shift toward the center of the stream as the flow increases. This can increase scour in the bridge opening.

INSPECTION OF BRIDGES FOR SCOUR

Introduction. There are two main objectives to be accomplished in inspecting bridges for scour:

1. To accurately record the present condition of the bridge and the stream; and
2. To identify conditions that are indicative of potential problems with scour and stream stability for further review and evaluation by others.

In order to accomplish these objectives, the inspector needs to recognize and understand the interrelationship between the bridge, the stream, and the floodplain. Typically, a bridge spans the main channel of a stream and perhaps a portion of the floodplain. The road approaches to the bridge are typically on embankments which obstruct flow on the floodplain. This overbank or floodplain flow must, therefore, return to the stream at the bridge and/or overtop the approach roadways. Where overbank flow is forced to return to the main channel at the bridge, zones of turbulence are established and scour is likely to occur at the bridge abutments. Further, piers and abutments may present obstacles to flood flows in the main channel, creating conditions for local scour because of the turbulence around the foundations. After flowing through the bridge, the floodwater will expand back to the floodplain, creating additional zones of turbulence and scour.

The following sections in this chapter present guidance for the bridge inspector's use in developing a comprehension of the overall flood flow patterns at each bridge inspected; and the use of this information for rating the present condition of the bridge and the potential for damage from scour. When an actual or potential scour problem is identified by a bridge inspector, the bridge should be further evaluated by an interdisciplinary team. The results of this evaluation should be recorded under Item 113 - Scour Critical Bridges.

If the bridge is determined to be scour critical, a plan of action should be developed for monitoring the structure and/or installing scour countermeasures.

Office Review. It is desirable to make an office review of bridge plans and previous inspection reports prior to making the bridge inspection. Information obtained from the office review provides a better basis for inspecting the bridge and the stream. Items for consideration in the office review include:

1. Has an engineering scour evaluation study been made? If so, is the bridge scour critical?
2. If the bridge is scour critical, are streambed profiles available and has a plan of action been made for monitoring and/or installing countermeasures?
3. What do comparisons of streambed cross sections taken during successive inspections reveal about the streambed? Is it stable? Degrading? Aggrading? Moving laterally? Are there scour holes around piers and abutments?
4. What equipment is needed (rods, poles, sounding lines, sonar, etc.) to obtain streambed cross sections?
5. Are there sketches and aerial photographs to indicate the planform location of the stream and whether the main channel is changing direction at the bridge?
6. What type of bridge foundation was constructed? (Spread footings, piles, drilled shafts, etc.) Do the foundations appear to be vulnerable to scour?
7. Do special conditions exist requiring particular methods and equipment (divers, boats, electronic gear for measuring stream bottom, etc.) for underwater inspection?
8. Are there special items that should be looked at? (Examples might include displaced riprap, stream channel at adverse angle of flow, problems with debris, etc.).

Bridge Inspection. During the bridge inspection, the condition of the bridge waterway opening, substructure, channel protection, and scour countermeasures should be evaluated, along with the condition of the stream.

The BI-5 section of this manual contains information relating to the coding for: Item 60--Substructure, Item 61--Channel and Channel Protection, and Item 71--Waterway Adequacy.

The guidance in this manual for rating the present condition of Items 60, 61 and 71 is set forth in detail. The following sections present approaches to evaluating the present condition of the bridge foundation for scour and the overall scour potential at the bridge.

Assessing the Substructure Condition. Item 60, Substructure, is the key item for rating the bridge foundations for vulnerability to scour damage. When a bridge inspector finds that a scour problem has already occurred, it should be considered in the rating of Item 60. Both existing and potential problems with scour should be reported so that a scour evaluation can be made by others. The scour evaluation is reported on Item 113, Scour Critical Bridges. If the bridge is determined to be scour critical, the rating of Item 60 should be evaluated to ensure that existing scour problems have been considered. The following items are recommended for consideration in inspecting the present condition of bridge foundations:

1. Evidence of movement of piers and abutments;

   Rotational movement (check with plumbline),

   Settlement (check lines of substructure and superstructure, bridge rail, etc., for discontinuities; check for structural cracking or spalling),

   Check bridge seats for excessive movement.

2. Damage to scour countermeasures protecting the foundations (riprap, guide banks, sheet piling, sills, etc.),

3. Changes in streambed elevation at foundations (undermining of footings, exposure of piles), and

4. Changes in streambed cross section at the bridge, including location and depth of scour holes.

In order to evaluate the conditions of the foundations, the inspector must take cross sections of the stream using the BI-4 form, noting location and condition of stream banks. Careful measurements should be made of scour holes at piers and abutments, probing soft material in scour holes to determine the location of a firm bottom. If equipment or conditions do not permit measurement of the stream bottom, this condition should be noted for further action.

Assessing Scour Potential at Bridges. The items listed in Table SC-1 are provided for bridge inspectors' consideration in assessing the adequacy of the bridge to resist scour. In making this assessment, inspectors need to understand and recognize the interrelationships between Item 60 (Substructure), Item 61 (Channel and Channel Protection), and Item 71 (Waterway Adequacy).

As noted earlier, additional follow-up should be made utilizing Item 113 (Scour Critical Bridges) when the bridge inspection reveals a potential problem with scour.

Table 5: Assessing the Scour Potential at Bridges

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1. UPSTREAM CONDITIONS
   a. Banks

      Natural vegetation, trees, bank stabilization measures such as riprap, paving, gabions, channel stabilization measures such as dikes and jetties.

      Bank sloughing, undermining, evidence of lateral movement, damage to stream stabilization measures, etc.

   b. Main Channel

      Clear and open with good approach flow conditions, or meandering or braided with main channel at an angle to the orientation of the bridge.

      Existence of islands, bars, debris, cattle guards, fences that may affect flow.

      Aggrading or degrading streambed.

      Evidence of movement of channel with respect to bridge (make sketches, take pictures).

   c. Floodplain

      Evidence of significant flow on floodplain.

      Floodplain flow patterns - does flow overtop road and/or return to main channel? Existence of floodplain development and any obstruction to flows approaching the bridge and its approaches.

      Evidence of overtopping approach roads (debris, erosion of embankment slopes, damage to riprap or pavement, etc.).

   d. Debris

      Extent of debris in upstream channel.

   e. Other Features

      Existence of upstream tributaries, bridges, dams, or other features, that may affect flow conditions at bridges.

Table 5: Assessing the Scour Potential at Bridges (continued)

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2. CONDITIONS AT BRIDGE

a. <u>Substructure</u>

Evidence of local scour at piles or piers. (Is piling exposed below casing.)

Obstruction of flows (Does substructure collect debris?)

b. <u>Superstructure</u>

Evidence of overtopping by floodwater (Is superstructure tied down to substructure to prevent displacement during floods?)

Obstruction to flood flows (Does superstructure collect debris or present a large surface to the flow?)

Design (Is superstructure vulnerable to collapse in the event of foundation movement, e.g., simple spans and non-redundant design for load transfer?)

c. <u>Channel Protection and Scour Countermeasures</u>

Riprap (Is riprap adequately toed into the streambed or is it being undermined and washed away? Is riprap pier protection intact, or has riprap been removed and replaced by bed-load material? Can displaced riprap be seen in streambed below bridge?)

Guide banks (Spur dikes) (Are guide banks in place? Have they been damaged by scour and erosion?)

Stream and streambed (Is main current impinging upon piers and abutments at an angle? Is there evidence of scour and erosion of streambed and banks, especially adjacent to piers and abutments? Has stream cross section changed since last measurement? In what way?)

d. <u>Waterway Area</u>

Does waterway area appear small in relation to the stream and floodplain? Is there evidence of scour across a large portion of the streambed at the bridge? Do bars, islands, vegetation, and debris constrict the flow and concentrate it in one section of the bridge or cause it to attack piers and abutments? Do the superstructure, piers, abutments, and fences, etc., collect debris and constrict flow? Are approach roads regularly overtopped? If waterway opening is inadequate, does this increase the scour potential at bridge foundations?

Table 5: Assessing the Scour Potential at Bridges (continued).

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3. DOWNSTREAM CONDITIONS

   a. Banks

      Natural vegetation, trees, bank stabilization measures such as riprap, paving, gabions, channel stabilization measures such as dikes and jetties.

      Bank sloughing, undermining, evidence of lateral movement, damage to stream stabilization measures, etc.

   b. Main Channel

      Clear and open with good "getaway" conditions, or meandering or braided with bends, islands, bars, cattle guards, and fences that retard and obstruct flow.

      Aggrading or degrading streambed.

      Evidence of movement of channel with respect to the bridge (make sketches and take pictures).

   c. Floodplain

      Clear and open so that contracted flow at bridge will return smoothly to floodplain, or restricted and blocked by dikes, development, trees, debris, or other obstructions.

      Evidence of scour and erosions due to downstream turbulence.

   d. Other Features

      Downstream dams or confluence with larger stream which may cause variable tailwater depths. This may create conditions for high velocity flow through bridge.

Underwater Inspections

Perhaps the single most important aspect of inspecting the bridge for actual or potential damage from scour is the taking and plotting of measurements of stream bottom elevations in relation to the bridge foundations. Where conditions are such that the stream bottom cannot be accurately measured by rods, poles, sounding lines or other means, other arrangements need to be made to determine the condition of the foundations. Other approaches to determining the cross section of the streambed at the bridge include:

1. Use of divers.
2. Use of electronic scour detection equipment.

For the purpose of evaluating resistance to scour of the substructure under Item 60 the questions remain essentially the same for foundations in deep water as for foundations in shallow water:

1. What does the stream cross section look like at the bridge?
2. Have there been any changes as compared to previous cross section measurements? If so, does this indicate that (1) the stream is aggrading or degrading, (2) local or contraction scour is occurring around piers and abutments, or (3) the channel migrating?
3. What are the shape and depths of scour holes?
4. Is the foundation footing (or the piling) exposed to the stream flow; and if so, what is the extent and probable consequences ofthis condition?
5. Has riprap around a pier been moved or removed?

CHAPTER 12: FRACTURE CRITICAL MEMBERS AND FRACTURE CRITICAL BRIDGES

A fracture critical member (FCM) is defined by the NBIS as a steel member in tension, or with a tension element, whose failure would probably cause apportion or the entire bridge to collapse. Since the member is loaded in tension, the failure usually occurs quickly and the collapse of the structure is sudden.

A fracture critical bridge must have one or more fracture critical members. The December 15, 1967 collapse of the Point Pleasant (Silver) Bridge over the Ohio River was due to the sudden failure of a hanger, a metal strap which held up a major portion of the bridge. This example of the sudden failure of a fracture critical member resulted in the loss of 46 lives. This catastrophe was the triggering event that led Congress to create the National Bridge Inspection Standards.

NEED FOR INTENSIVE INSPECTION

In most situations the only means available to detect flaws in a bridge member is visual inspection. It is important to identify a flaw early in the typical crack development scenario. If the defect is identified as soon as it can be seen by the inspector, the useful service life of the member may have already been reduced by more than 80%.

Fractures have occurred on bridges that have been open to traffic relatively short periods of time. On such a structure, there may be only one opportunity for the inspector to identify the flaw and prevent the fracture. If the fracture will cause a sudden failure of all or part of the bridge, it is important that the defect be identified in time to prevent a possible catastrophe. The flaw is often very small. The inspector has to be up-close, has to know where to look, and has to recognize the crack when it first becomes visible.

Fracture Critical Member Training Course. The FHWA recognized that special training was needed on the topic of FCMs. A three and a half day training course covering advanced topics has been developed and is entitled *Fracture Critical Inspection Techniques for Steel Bridges*, NHI-130078. This course has been based upon the FHWA report and upon a paper entitled "Inspection of Fracture Critical Bridge Members" prepared by Mr. Ron L. Purvis of the firm of Byrd, Tallamy, MacDonald, and Lewis.

Participants learn in the FCM course how to identify a tension member and how to determine if its failure will result in a sudden bridge collapse. A great amount of additional material is presented to help participants identify the types of structures subject to tensile failures, the role of fatigue and crack growth, FCM inspection procedures, and other information to help organize and conduct a FCM program.

FAILURE MECHANISM

An understanding of FCM failure mechanisms is instrumental in identifying bridges subject to FCM cracking and fracture. Some of the key concepts and terms will be introduced in the following paragraphs.

The Role of Tensile Stress. The bridge member in tension is being pulled apart. This causes cracks to grow and a fracture to occur. A member in *axial* tension is stressed the same throughout the cross section for the total length between connections. Hangers, suspension cables and some truss members normally are stressed in axial tension. For members experiencing *bending*, the stress varies from tension to compression at a given member cross section. The inspector must be aware of tension zones in such members. For example, on a simply supported beam, maximum tension is in the bottom flange at midspan. An equally important location on a continuous span is the tension zone in the top flange over the interior support. Shear is a force generated by equal but opposite transverse forces trying to slide one section of a member past an adjacent member section. The vertical and horizontal shearing forces create a resultant diagonal tensile force that will try to tear the material. An example includes the pin in a pin ad hanger assembly. High tensile stress may also be concentrated at locations along a member where the cross section changes size or shape, or where there is a discontinuity.

Crack Initiation and Propagation. Most cracks in steel bridges occur at predictable locations. Cracks occur at areas of *stress concentration*. They normally originate at a *flaw*. The flaw is often associated with a *weld*. When a fatigue crack caused by in-plane bending grows to a size visible to the inspector, at least 80% of the service life of the member has usually already expired. The small crack has been growing beneath the surface in a semi-elliptical pattern. After the crack reaches the surface it must penetrate through the paint before it is visible to the inspector. Occasionally the visibility is accentuated by rust stains that are associated with the crack.

Non-destructive testing (NDT) is available to help verify the existence of a crack. After the crack has been found, this type of test will locate the crack's boundaries and measure the size. NDT is, however, not very effective in general inspection to find cracks that have not been identified.

The Role of Redundancy. For the inspector to determine if a sudden collapse will occur when a bridge member fractures, it is necessary to understand the term redundancy as it applies to primary bridge members or connections. *Redundancy* is the ability of other members to help carry the load when a member becomes weak or fails. Three different types of bridge member redundancy are possible depending upon the design of the structure. The types are (1) load path, (2) structural, and (3) internal.

Load path redundancy relates to the minimum number of members required to support the deck under traffic. A bridge with less than three girders or trusses is considered *nonredundant* and therefore fracture critical. Bridges with three or more girders are considered redundant, because if one girder becomes weak the others will help carry the load. There are degrees of redundancy that should be considered depending on the girder spacing, stiffness of the deck, and framing system. A capacity analysis by a structural engineer may be necessary to predict the failure scenario and degree of redundancy for some bridges.

Structural redundancy relates to the support provided by the cantilever created after a continuous member is weakened. This occurs only on interior spans with members continuous across supports on both ends. There must be a minimum of three continuous spans to have a structurally redundant span, which is located in the center.

Internal redundancy relates to crack propagation through the cross section of a member. Some members are composed of several parts. A crack working its way through one part stops when it comes to the end of that part. The crack must re-initiate in each part on internally redundant members. Built-up members with plates attached by rivets or bolts have internal redundancy. For members composed of continuous parts, the crack does not stop at the end of a part, but continues directly into the next part. Rolled steel members have no internal redundancy; nor do built-up welded members. A study of fatigue and fracture of steel members showed that cracks not only propagate freely through welds, they often initiate because of the weld.

Only load path redundancy is considered for determination of FCMs.

FACTORS CONTRIBUTING TO TENSILE FAILURE

Fatigue. It is very important that the inspector try to identify a crack or flaw before the member fractures. The inspector's efficiency at identifying FCM problems is significantly enhanced by an understanding of fatigue and fracture. Three physical factors are especially important. These physical characteristics make certain members more susceptible to fracture. First, the magnitude of the total stress and the number oftimes (cycles) a member is stressed contribute to the fracture. Second, design details have an important influence on crack initiation. The third factor is the presence of flaws in the member.

Fractures require a driving force. Normally this force is produced by the load on the structure. The force divided by the area of a particular cross section of the member is called *stress*. The stress may take the form of compression, tension, or shear. *Compression* squeezes a member (pushes the ends toward each other). Cracks normally do not cause problems in compression members since the material is not being pulled apart. If a crack exists in a compression member (which is rare) there is not a force to make it grow. *Tension* stretches or pulls a member apart. Cracks are of concern in tension members since the stress causes it to fracture. The cracks grow perpendicular to the direction of the tension stress. *Shear* is similar to tension but rather than pull the member apart, it tends to tear or slice the material. Some cracks grow as a result of shear. The direction of a shear crack is at a 45^{o} angle to the force. Bridge members may be subjected to any one or a combination of these stresses.

The fracture may be the result of an overload where the member is stressed beyond its useful capacity or *yield point*. This rarely occurs on bridges designed to carry standard legal loads. More often cracks are caused by repeated loads that do not exceed the legal load limit. *Fatigue* is the term used to describe the process of material damage due to repeated loads. One load is a cycle. A cycle must subject the member to a certain magnitude of stress before it is significant in causing fatigue cracks. Bridges that carry a large volume of heavy loads are more likely to experience fatigue problems.

Fatigue crack initiation is not only related to the number and size of stress cycles, it is also related to *design details*. Stress concentrates at locations where the rigidity of the member changes. Fatigue occurs at points of stress concentration. Details that cause changes in the rigidity of the member have been categorized in the FCM course materials to help the designer avoid cracking problems. These categories may also be used by the inspector to help predict crack initiation in existing bridges.

Flaws. All bridge members have flaws. Their size and location influence crack initiation and propagation. Flaws provide a focus of crack initiation. It may be in the base metal of the member or in the weld metal. Many flaws are not visible. Non-destructive testing (NDT) is used to identify these flaws during the shop inspection. On older bridges NDT was not always required. Field welds and repair welds often do not receive NDT.

Flaws in the base metal may be caused by fabrication, transportation, erection, or in-service damage. Such flaws include bolt and rivet holes, notches, grinding marks, copes, and flame cuts. Service flaws would include collision damage, damage from improper straightening or section loss caused by corrosion.

Design Considerations. Fatigue cracks initiate at locations in steel members where the rigidity of the member changes. These locations are created by designers attempting to save material. For example, cover plates are added to beams to avoid using a larger size. Stiffeners are used to allow very thin webs on members. As the member bends under a load, stress is concentrated at areas where the rigidity in the member changes (for example, at the end of the cover plate or stiffener). Cracks start at these locations.

Plane of Bending. Fatigue cracks may be a result of either in-plane or out-of-plane bending. *In-plane bending* is a result of load distributed from the bridge floor directly to the member. *Out-of-plane bending* is usually the result of the load being transferred to the member through secondary members. This force tends to twist the member, and may be transmitted into thin parts of the members, such as a web that was not designed to resist the stress. A crack may initiate in the web in the space between the connection plate or stiffener and the flange. Often the crack is not perpendicular to the primary stress, therefore it does not represent as immediate a problem as the crack caused by in-plane bending. Inspectors, however, are cautioned to bring any cracks to the attention of a qualified structural engineer for evaluation.

Loads on the Structure. Another factor that influences the development of a fracture is the loading rate. *Static loading* is least likely to produce brittle fracture, whereas *dynamic loading* often results in a brittle or sudden fracture. Bridges usually experience a combination of static and dynamic loading. Inspectors should be aware of situations where the dynamic loading is exceptionally high. Examples are bridges that receive heavy pounding loads. High volumes of trucks, coupled with low approaches or poor vertical alignment might cause this added impact effect.

Fatigue cracking is caused by repeated loads that produce stress cycles. Larger loads create stress cycles that cause fatigue damage. A certain structural member or design detail may be capable of carrying a limited number of stress cycles that are created by the larger loads using the structure. When the number of cycles exceeds the limit, cracking occurs at predictable locations.

EXAMPLES OF FCM STRUCTURE TYPES

Structures that have fracture critical members are subject to sudden tension failure. Examples include simple and continuous span structures supported by two or less single web girders, box girders, trusses, suspension cables, floorbeams, bent caps, and tie members of tied arch spans.

Fracture critical bridges are known to exist in Alabama. Several examples have been listed in Table 1 to illustrate this point. Keep in mind that this is a limited listing of examples. There are additional types of fracture-critical bridges, and many other particular structures in this state are fracture critical.

Table 6: Examples of Alabama Fracture-Critical Bridges

Member or Bridge Type	Example
Truss	There are many types and styles of trusses - Warren, Howe, pony, through, and deck being a few of the most common. The truss may also be simple-span or continuous. In all cases, a truss-type bridge is considered to be fracture critical. The O'Neal Bridge over the Tennessee River on U.S. 43 between Colbert and Lauderdale counties is an example of both a through and deck truss.
Two-Girder	If a design provides only two supporting girders or beams, the bridge is fracture critical. An example is the Kowaliga Bridge over Lake Martin on Alabama 63.
Tied Arch	Alabama's only tied arch bridges are across the Mobile River Delta on I-65 north and southbound lanes near Mobile. This design is similar to a 2-girder system.
Steel Bent Caps	Steel bent caps were used extensively in the Interstate system and are quite common. However, they should be inspected with the understanding that they are fracture critical. One example is the steel bent cap at Bent 78, South Bound Lane, Ramp 8, I-565 in Madison County, near Huntsville.
Pins and Hangers	The pins and hangers used in the design and construction of bridges create a fracture critical connection. Examples of this connection are the Kowaliga Bridge on Alabama 63, and the I-65 ramp over Holt Street and West Jeff Davis Avenue in Montgomery.

INSPECTION DETAILS

The FCM inspection is normally very labor intensive. The inspector spends a great deal of time looking in unusual and hard-to-get-to locations. All FCMs are required to be clearly identified with plans, sketches, photographs, or a combination of these and placed in the bridge file to show the various locations of each fracture critical member. While at the site, the inspector typically views these locations from several sides and angles using additional light or magnification if necessary.

The FCM training course points out clues to potential tensile failures, including horizontal or vertical misalignment of spans, unusual movements or noise, and distortions or damage to structural members.

The inspector focuses on tension zones of FCMs and fracture critical connections. The locations of stress concentrations receive special attention. Examples of details that are normally checked closely include the following:

1. Intermittent welds between the web and tension flange
2. Areas of sudden change of cross-section near the ends of cover plates
3. Locations of stress risers such as nicks, scars, flaws, and holes that have plug welds, irregular weld profiles and areas where the base metal has been under cut
4. Locations where stiff bracing members of horizontal connection plates are attached to their webs and girder flanges
5. The floor beam and girder web adjacent to a floor beam connection plate
6. Gusset plates, improperly coped members re-entering corners and the gap between web stiffeners and flanges
7. Longitudinal and vertical stiffener intersections
8. Longitudinal stiffeners that have been connected together with butt welds
9. Location of welds at gusset-transverse-web intersections
10. Flanges that pass through a web such as girder flange passing through a box girder pier cap
11. Box beam to column intersection
12. Eyebars / Truss Members.

Discontinuities resulting from in-service problems are also scrutinized. Examples of these are corrosion, flaws and welded repairs. Areas where corrosion is likely to give problems include the following examples:

1. Under deck joints
2. In the areas around scuppers and drain pipes
3. Under open steel grates
4. On flat surfaces where debris accumulates
5. On exposed surfaces of fascia members
6. On steel in contact with concrete
7. At overlapping steel plates
8. At corners of steel angles and channels.

Other special details that deserve special attention during the FCM inspection are:

1. Shear connectors in the negative moment region
2. Pin and hanger assemblies
3. Tack welds on bolted or riveted connections
4. Unfilled holes or holes filled with weld metal
5. Field welds in tension zones
6. Suspicious attachments, or attachments which make tension zones in members, such as utility attachments.

DEPARTMENT GUIDELINES FOR FCMs

The Alabama Department of Transportation emphasizes the importance of intensive training as the best method to identify fracture critical members and to periodically inspect them for flaws, cracks, or other indications of the beginnings of tensile failure. This is reflected in the following guidelines, which have been adopted by the Department.

1. Fracture critical bridges will be inspected on a basis that may be more frequent than every two years.

2. The Department's goal is to have each of its bridge inspectors complete a training course in the identification and inspection of fracture critical members.

3. The goal will be for each local government bridge inspection unit to have one or more inspectors who have successfully completed a fracture critical member training course.

4. For each FCM, the bridge inspector will prepare an inspection program recognizing the special needs for "hands-on" inspection, special equipment to allow such access, and the potential need for NDT or other advanced methods to verify cracking.

SUMMARY

Tension failures in structural members normally occur very quickly. Where other members of the bridge cannot absorb the additional stresses created by a tensile failure, the absence of load path redundancy contributes to rapid collapse of the structure.

Fracture critical members are restricted to steel members only. This section has outlined some of the important factors that contribute to such failures and the importance of the FHWA training course on inspection of FCMs.

This section has been intended as a brief overview of the subject and is not to be considered as a complete discussion of the topic. This section does not substitute for attending the FHWA training course on FCMs.

Where an inspector has questions about individual steel members that might be prone to tensile failure, the questions should be directed to the chief bridge inspector at the appropriate area office of the Alabama Department of Transportation. Should the issue not be resolved at that location, the Department inspector may call the Maintenance Bureau in the Department's Central Office for assistance.

APPENDICES

Appendix	**Contents**
A	Regions /Areas and Districts Maps
B	FIPS Place Codes
C	County Codes
D	Bridge Inspection Forms
E	Bridge Inspection Program Compliance
F	Underwater Inspection Field Reference
G	ALDOT Guidelines for Operation
H	Element Inspection Definitions
I	Load Rating
J	State Structures Underwater Inspection Frequency Exception

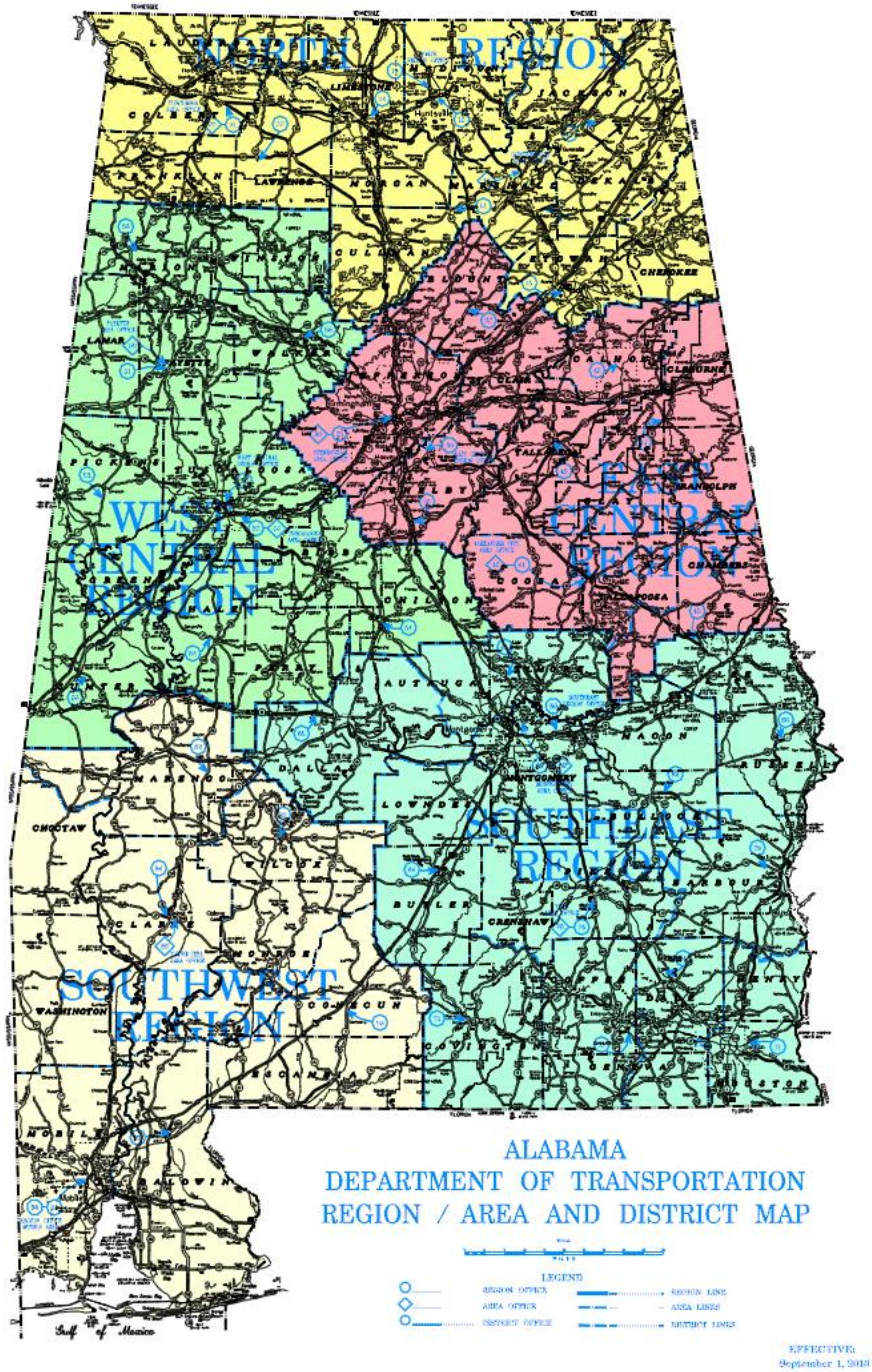


Figure A-1: State Map

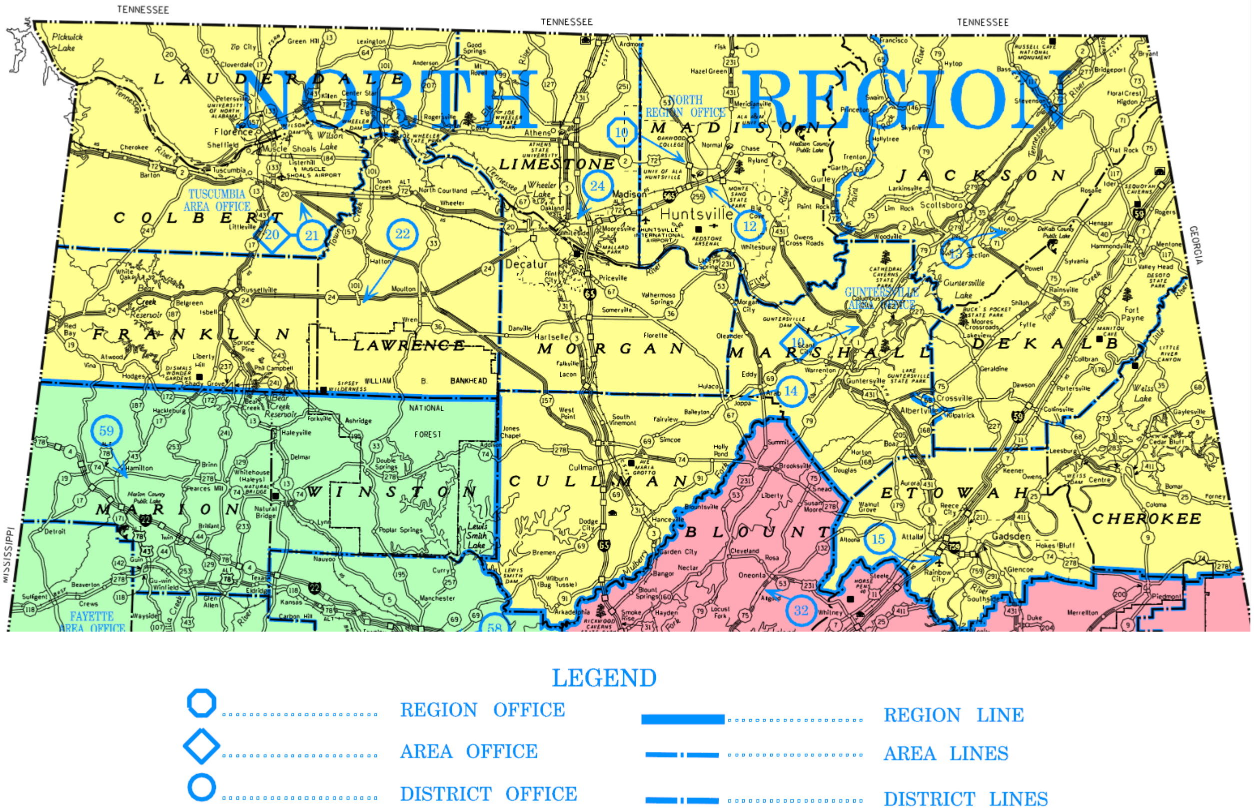


Figure A-2: North Region Map

<u>North Region Areas</u>

1. Guntersville
2. Tuscumbia

<u>North Region Counties</u>

1. Cherokee
2. Colbert
3. Cullman
4. DeKalb
5. Etowah
6. Franklin
7. Jackson
8. Lauderdale
9. Lawrence
10. Limestone
11. Madison
12. Marshall
13. Morgan

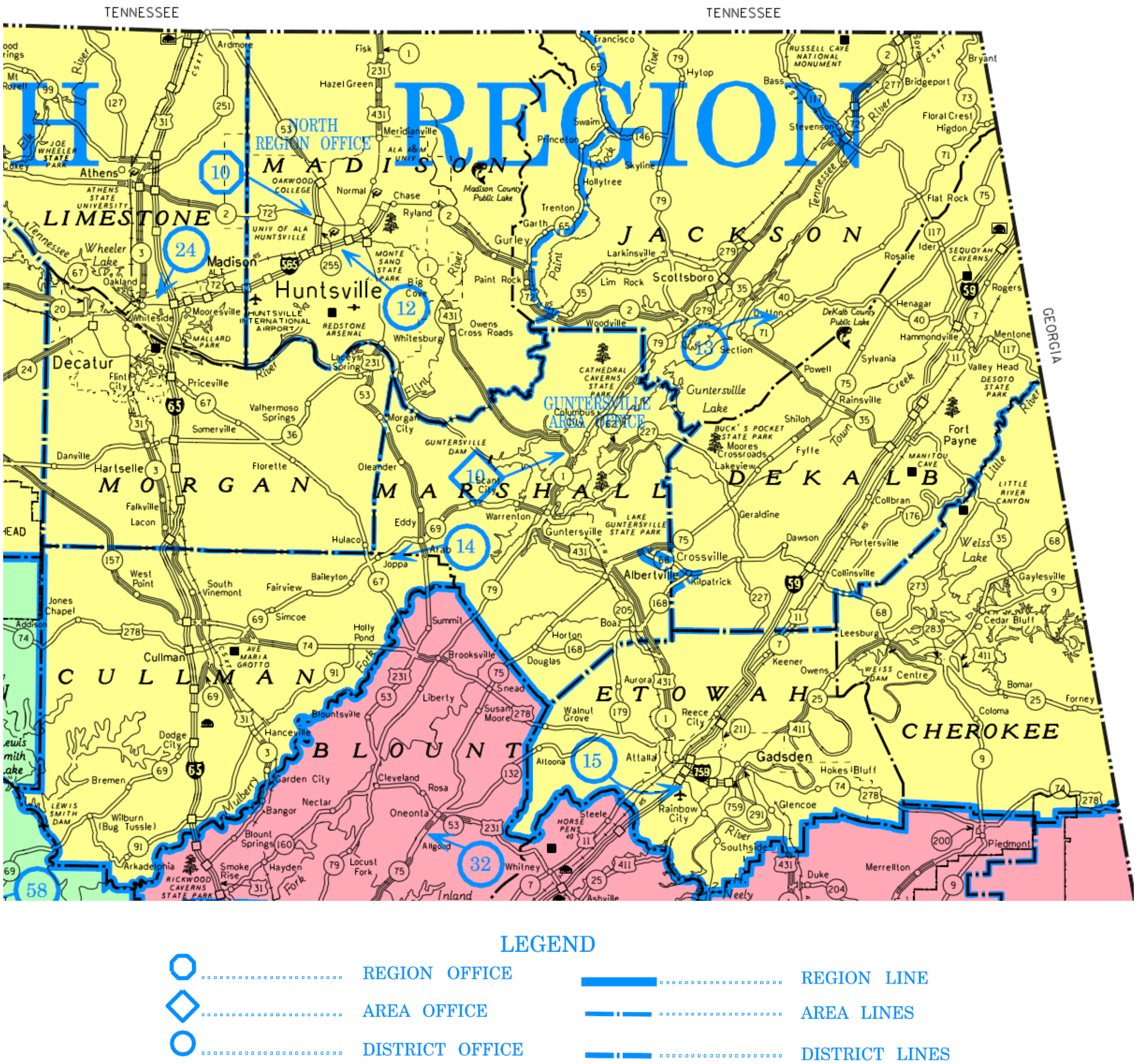


Figure A-3: Guntersville Area Map

Guntersville Area Counties

1. Cherokee
2. Cullman
3. DeKalb
4. Etowah
5. Jackson
6. Madison
7. Marshall

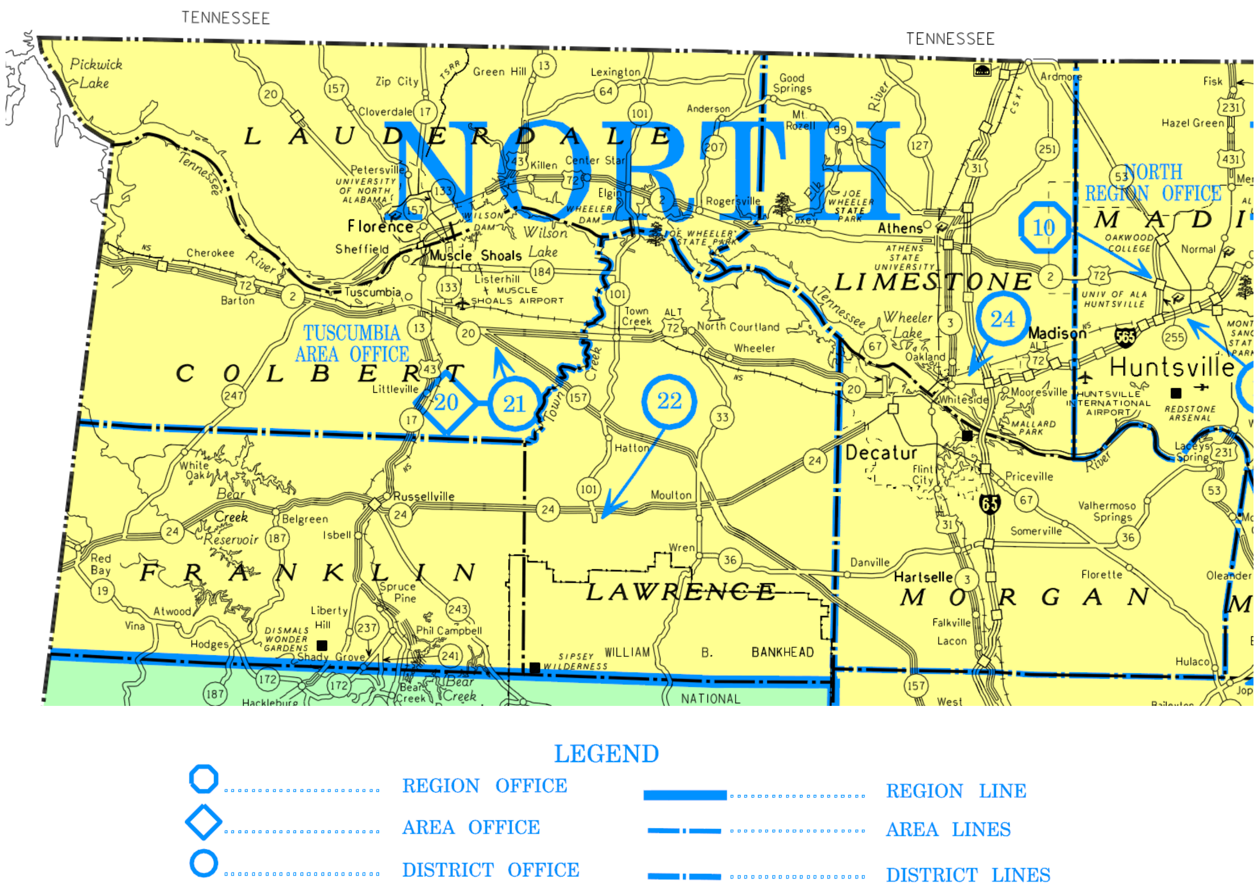


Figure A-4: Tuscumbia Area Map

Tuscumbia Area Counties

1. Colbert
2. Franklin
3. Lauderdale
4. Lawrence
5. Limestone
6. Morgan

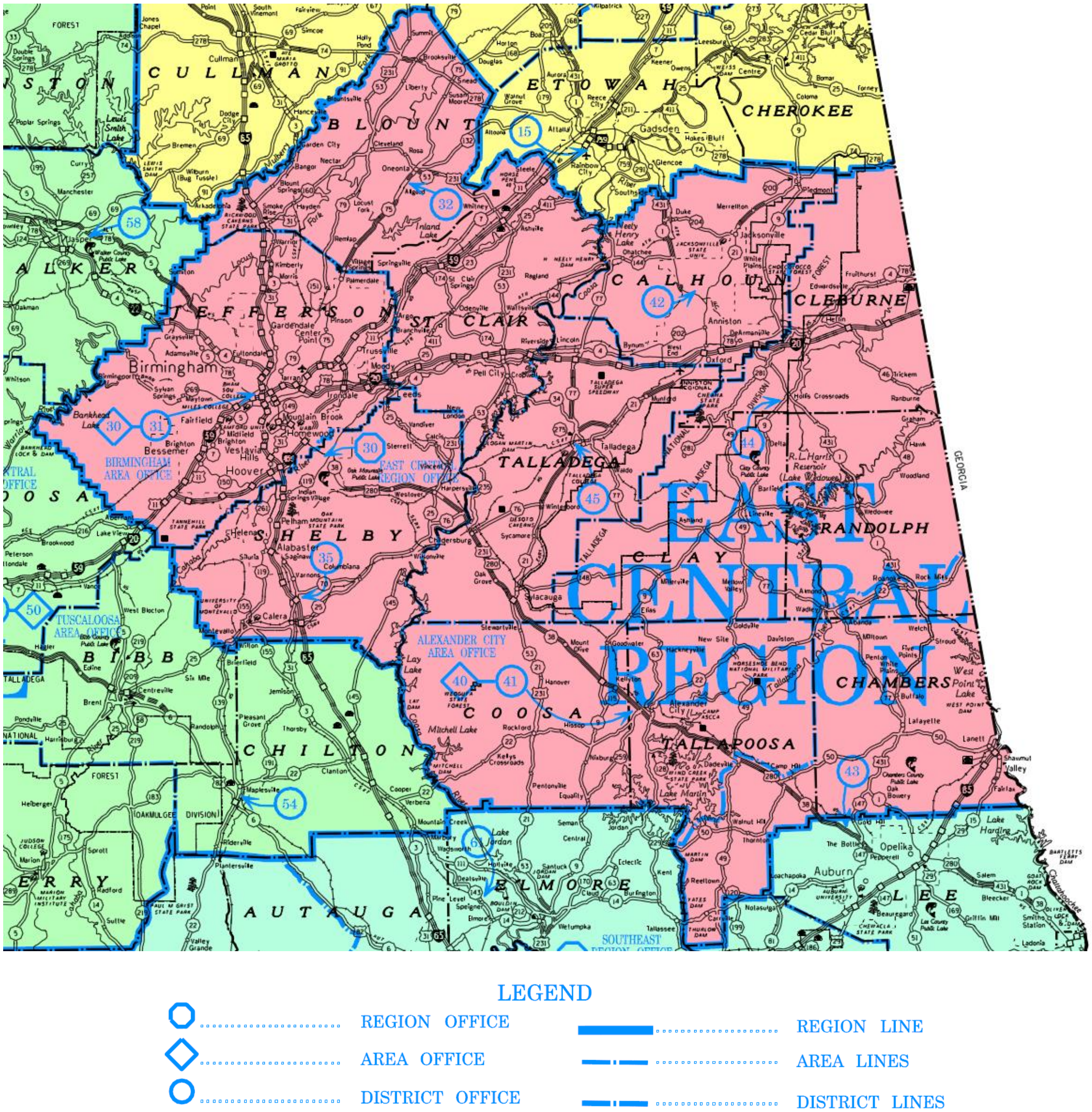


Figure A-5: East Central Region Map

East Central Region Areas

1. Alexander City
2. Birmingham

East Central Region Counties

1. Blount	5. Cleburne	9. Shelby
2. Calhoun	6. Coosa	10. St. Clair
3. Chambers	7. Jefferson	11. Talladega
4. Clay	8. Randolph	12. Tallapoosa

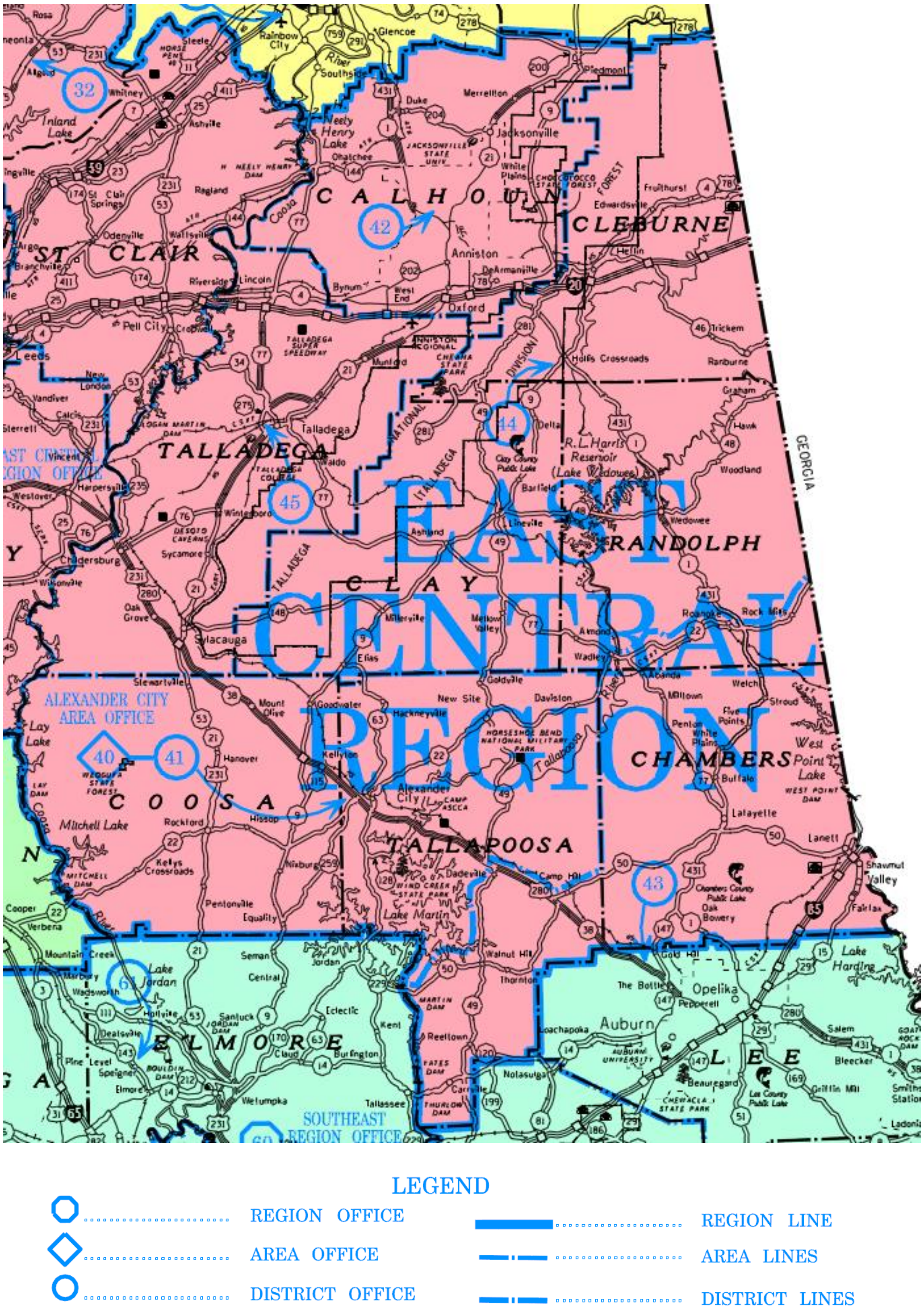


Figure A-6: Alexander City Area Map

<u>Alexander City Area Counties</u>

1. Calhoun
2. Chambers
3. Clay
4. Cleburne
5. Coosa
6. Randolph
7. Talladega
8. Tallapoosa

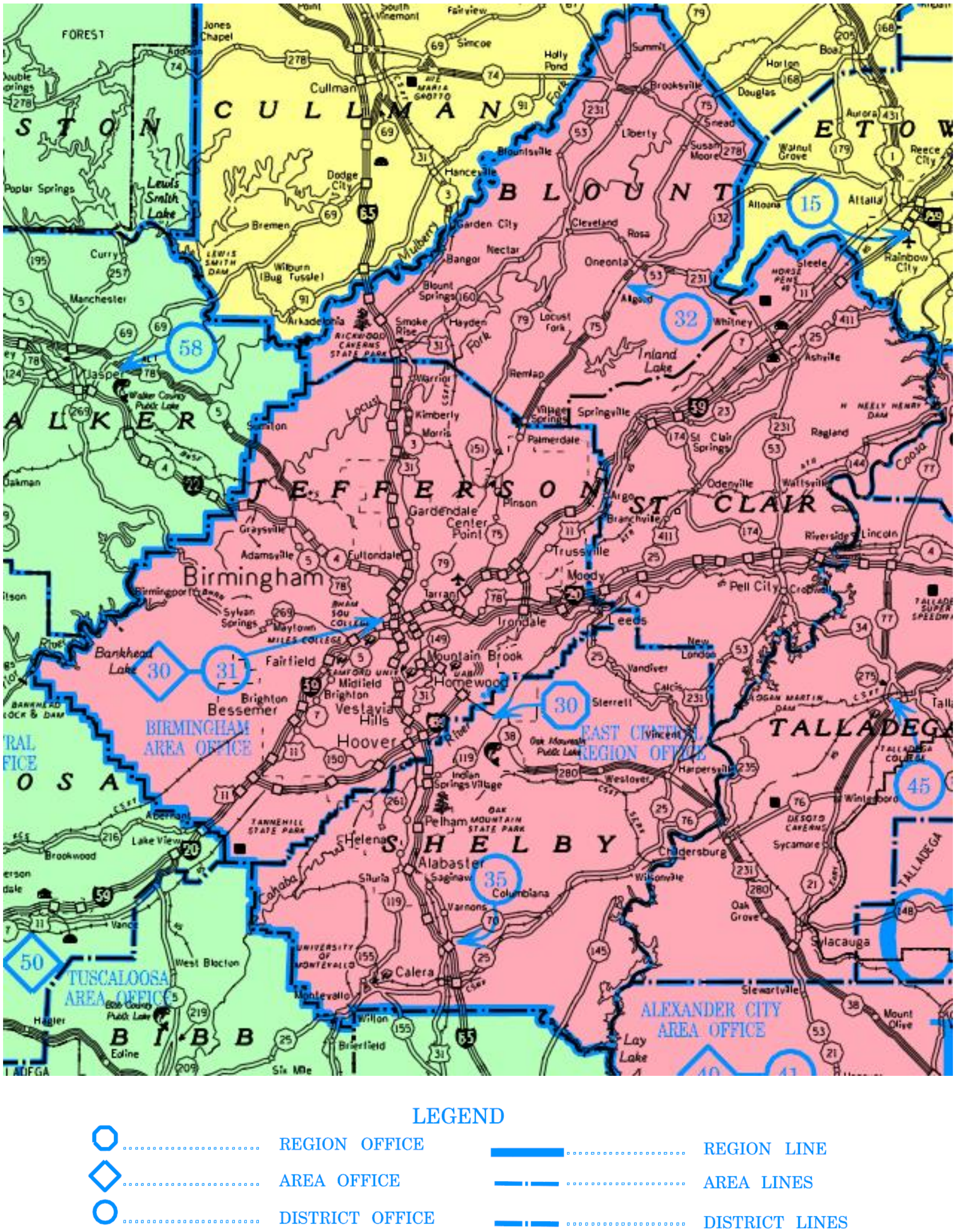
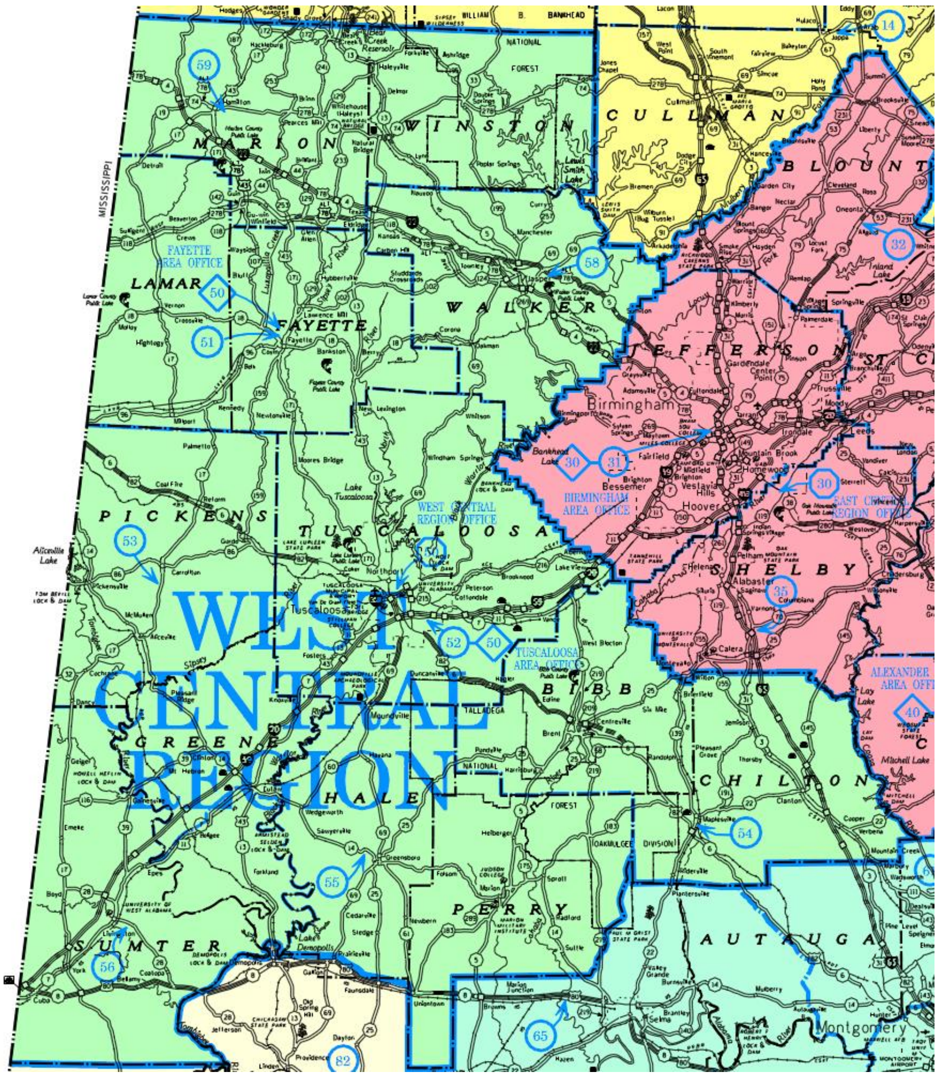


Figure A-7: Birmingham Area Map

<u>Birmingham Area Counties</u>

1. Blount
2. Jefferson
3. Shelby
4. St. Clair



LEGEND

⬡	REGION OFFICE	▬▬	REGION LINE
◇	AREA OFFICE	▬ · ▬	AREA LINES
○	DISTRICT OFFICE	▬ · ▬	DISTRICT LINES

Figure A-8: West Central Region Map

West Central Region Areas

1. Fayette
2. Tuscaloosa

West Central Region Counties

1. Bibb
2. Chilton
3. Fayette
4. Greene
5. Hale
6. Lamar
7. Marion
8. Perry
9. Pickens
10. Sumter
11. Tuscaloosa
12. Walker
13. Winston

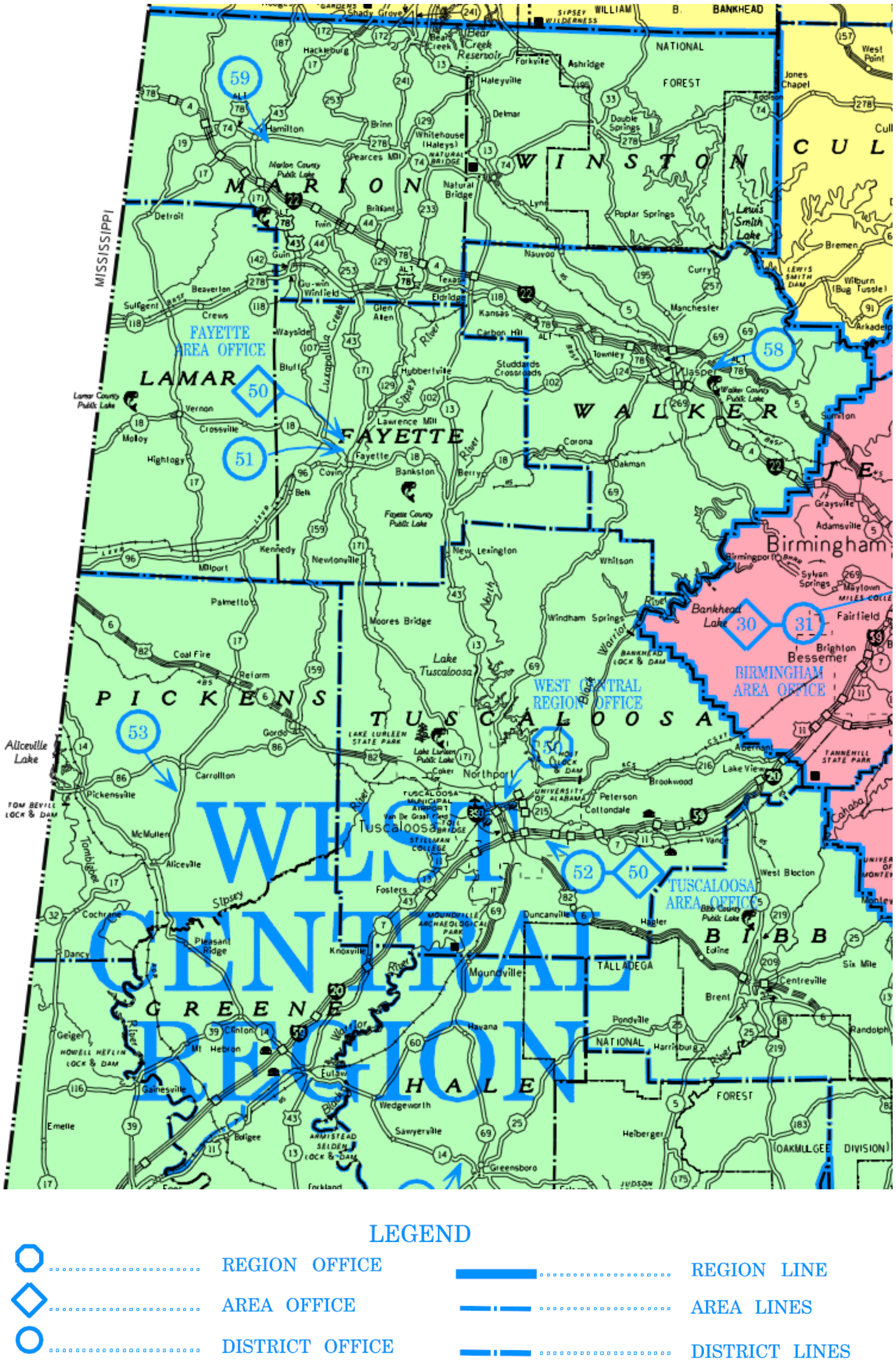


Figure A-9: Fayette Area Map

<u>Fayette Area Counties</u>

1. Fayette
2. Greene*
3. Lamar
4. Marion
5. Pickens
6. Walker
7. Winston

*Divided with the Tuscaloosa Area along US 11 / AL 7

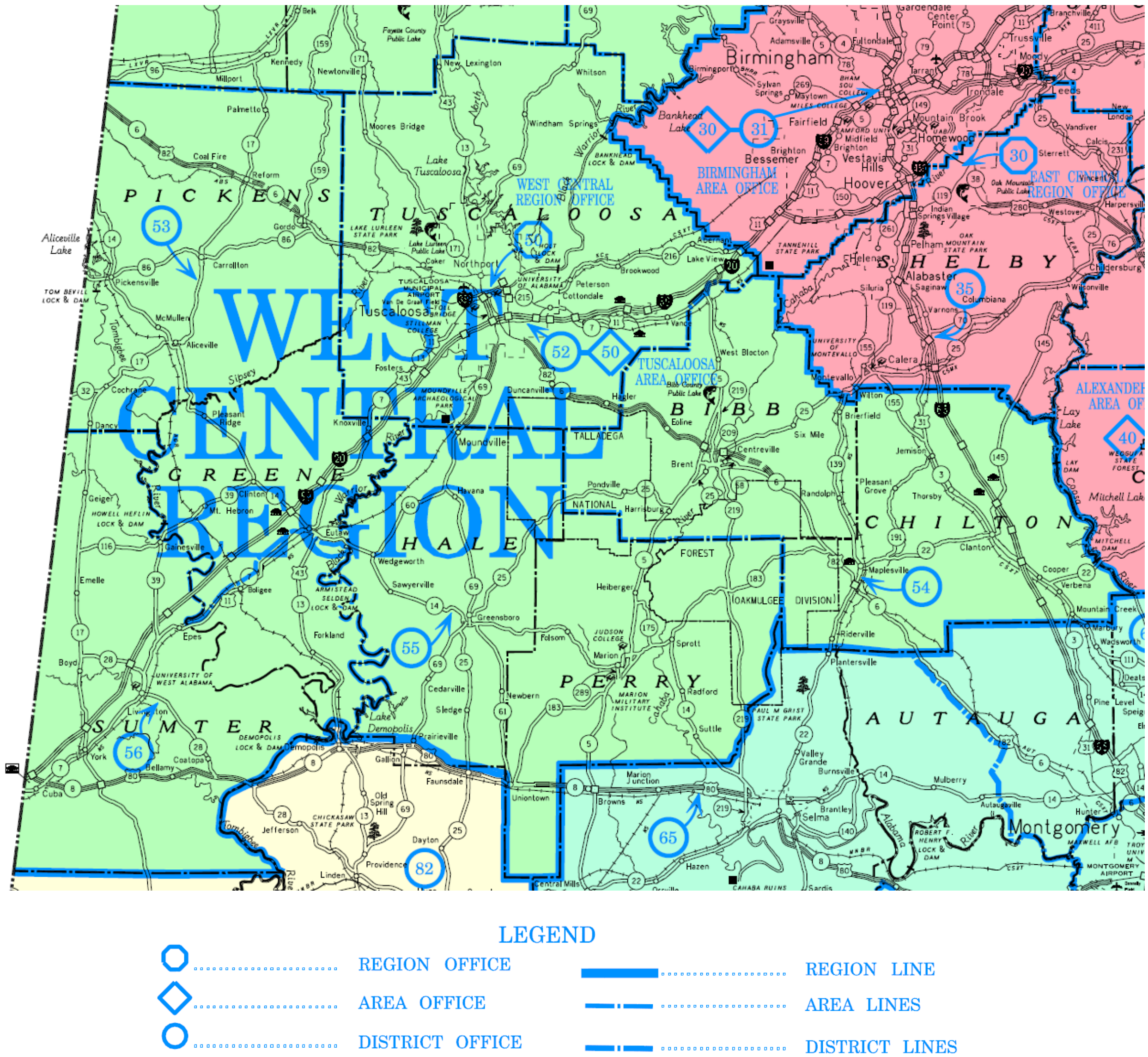


Figure A-10: Tuscaloosa Area Map

Tuscaloosa Area Counties

1. Bibb
2. Chilton
3. Greene*
4. Hale
5. Perry
6. Sumter
7. Tuscaloosa

*Divided with the Tuscaloosa Area along US 11 / AL 7

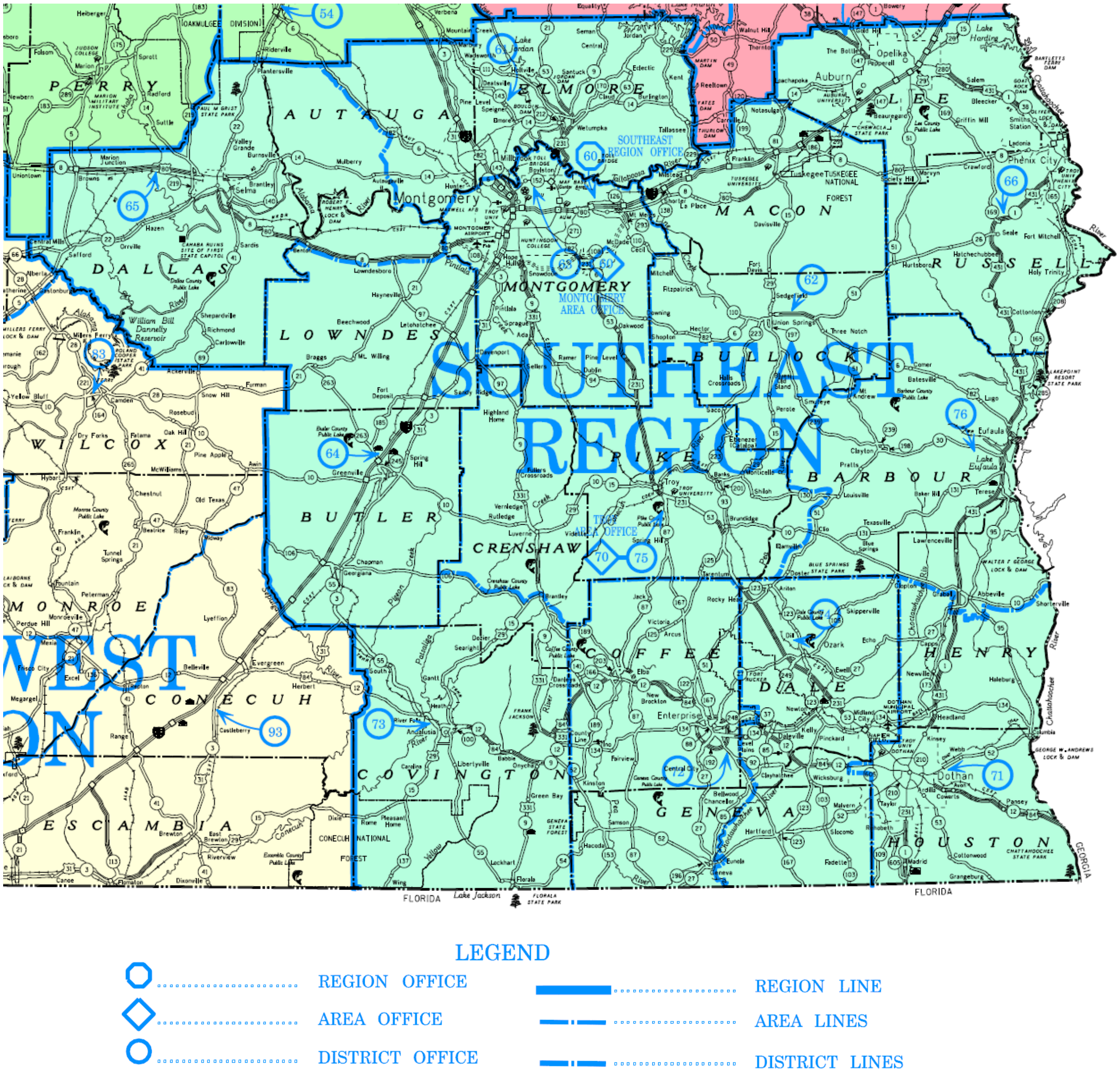


Figure A-11: Southeast Region Map

Southeast Region Areas

1. Montgomery
2. Troy

Southeast Region Counties

1. Autauga
2. Barbour
3. Bullock
4. Butler
5. Coffee
6. Covington
7. Crenshaw
8. Dale
9. Dallas
10. Elmore
11. Geneva
12. Henry
13. Houston
14. Lee
15. Lowndes
16. Macon
17. Montgomery
18. Pike
19. Russell

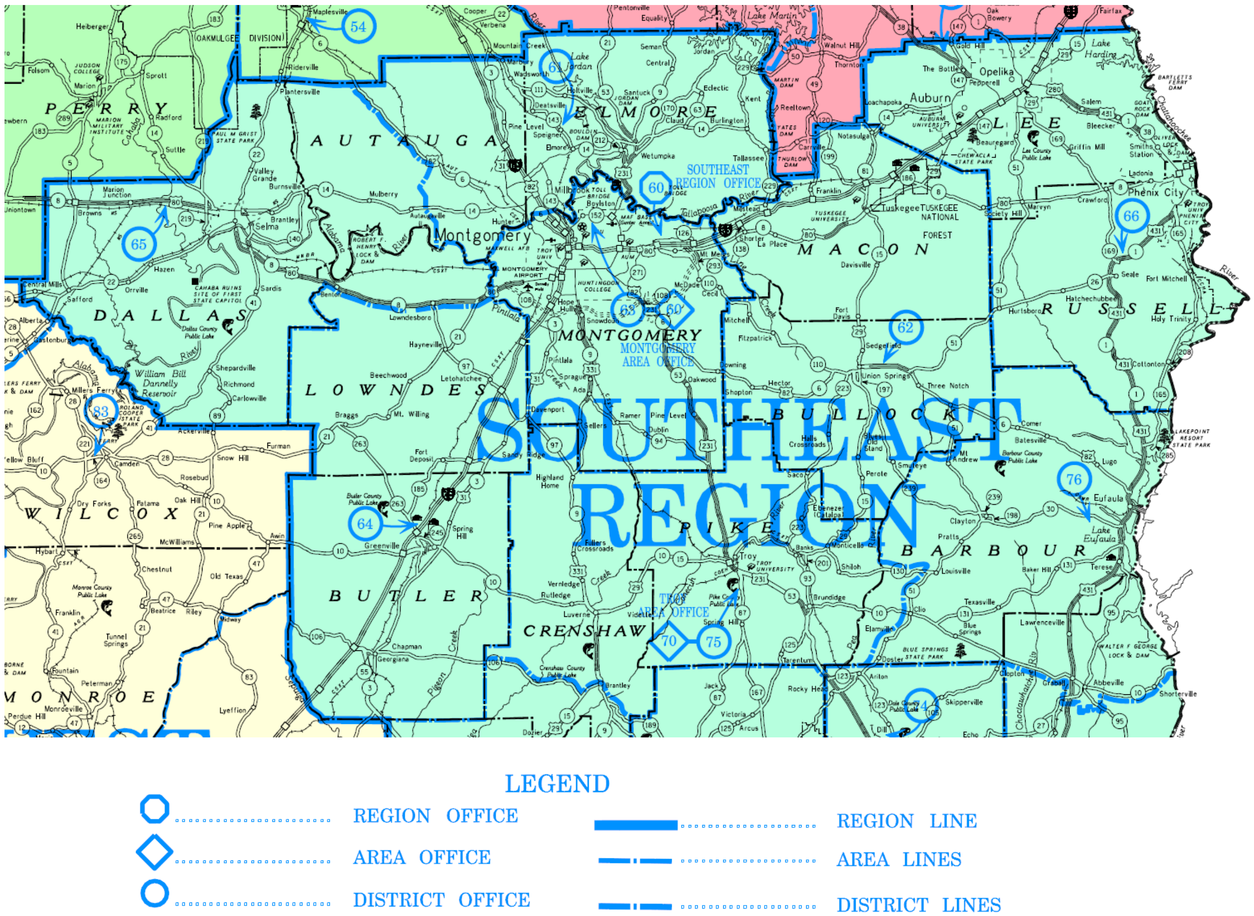


Figure A-12: Montgomery Area Map

Montgomery Area Counties

1. Autauga
2. Bullock
3. Butler
4. Dallas
5. Elmore
6. Lee
7. Lowndes
8. Macon
9. Montgomery
10. Russell

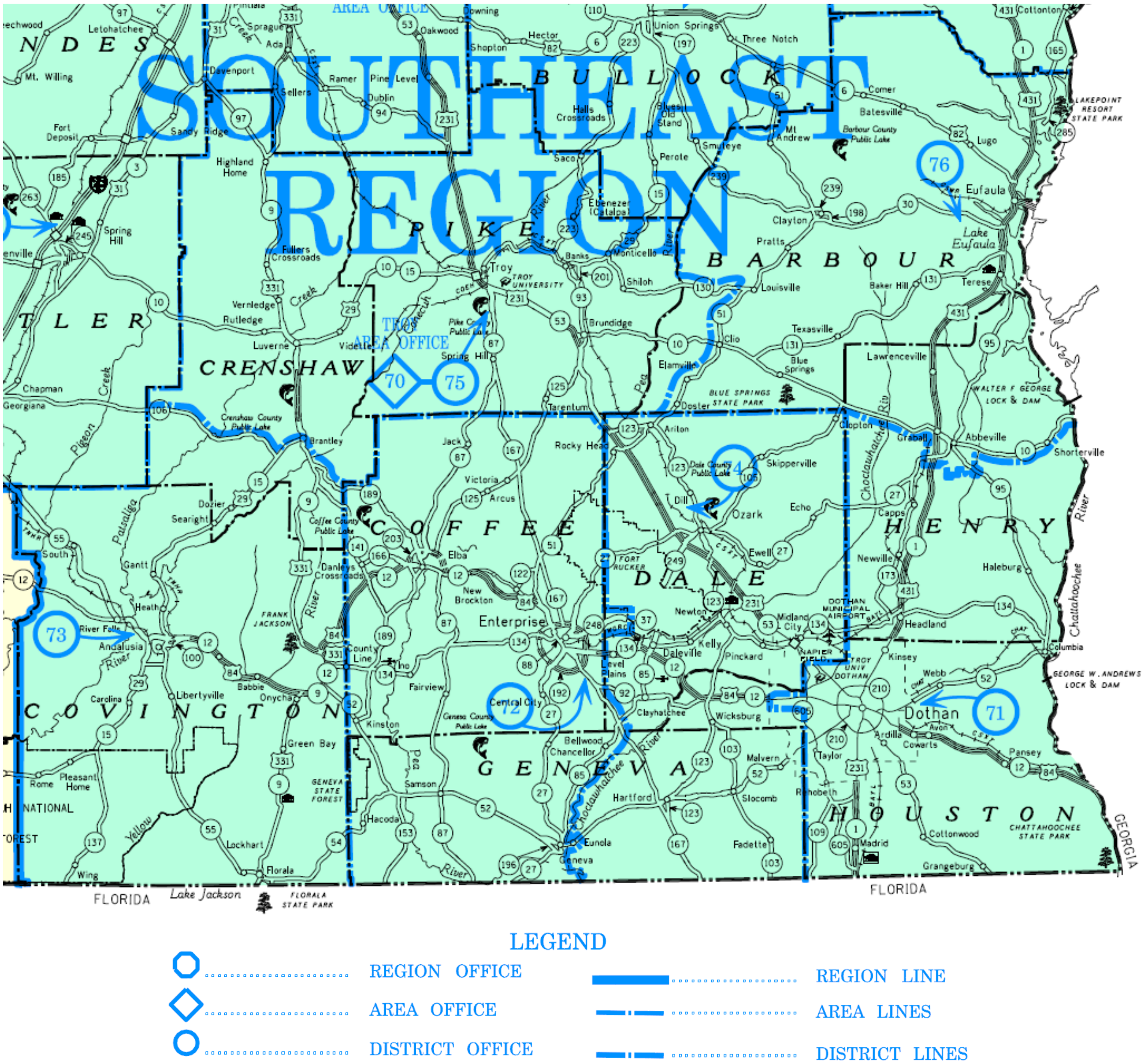


Figure A-13: Troy Area Map

<u>Troy Area Counties</u>

1. Barbour
2. Coffee
3. Covington
4. Crenshaw
5. Dale
6. Geneva
7. Henry
8. Houston
9. Pike

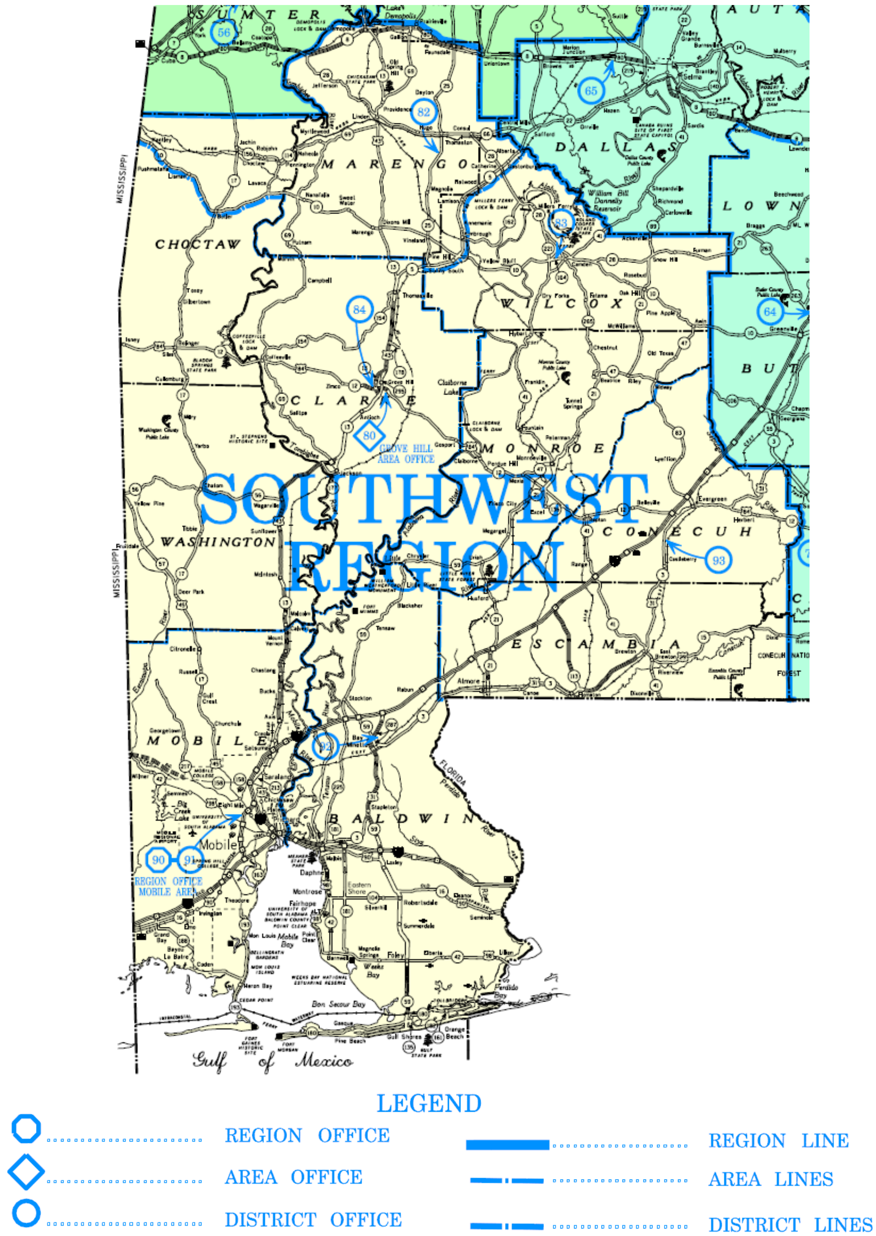


Figure A-14: Southwest Region Map

<u>Southwest Region Areas</u>

1. Grove Hill
2. Mobile

<u>Southwest Region Counties</u>

1. Baldwin
2. Choctaw
3. Clarke
4. Conecuh
5. Escambia
6. Marengo
7. Mobile
8. Monroe
9. Washington
10. Wilcox

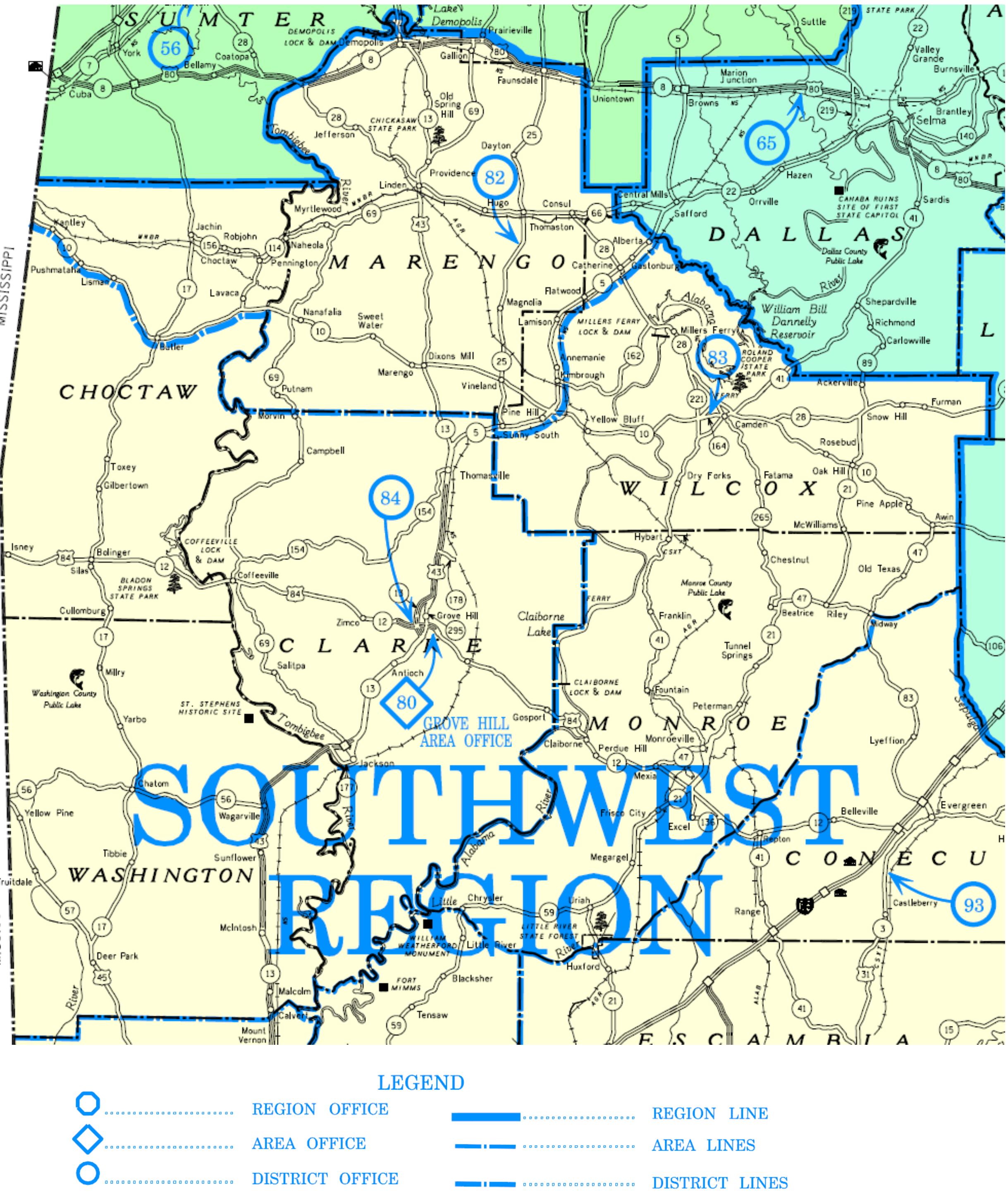


Figure A-15: Grove Hill Area Map

Grove Hill Area Counties

1. Choctaw
2. Clarke
3. Marengo
4. Monroe
5. Washington
6. Wilcox

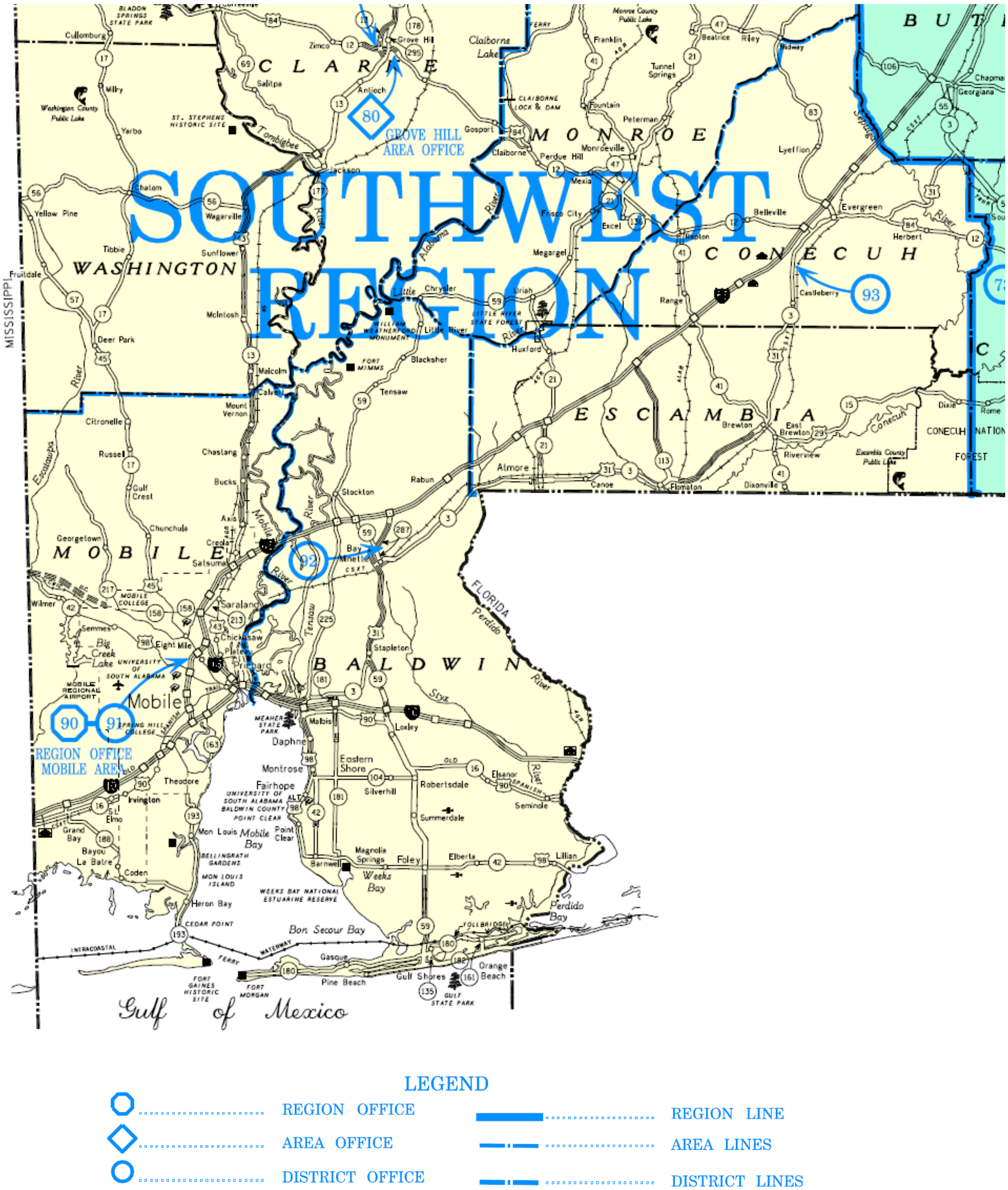


Figure A-16: Mobile Area Map

<u>Mobile Area Counties</u>

1. Baldwin
2. Conecuh
3. Escambia
4. Mobile

Appendix B

CITY	FIPS CODE
ADAMSVILLE	00460
ADDISON	00484
AKRON	00676
ALABASTER	00820
ALBERTVILLE	00988
ALEXANDER CITY	01132
ALICEVILLE	01228
ALLGOOD	01396
ALTOONA	01660
ANDALUSIA	01708
ANDERSON	01756
ANNISTON	01852
ARAB	02116
ARDMORE	02260
ARGO	02320
ARITON	02428
ARLEY	02500
ASHFORD	02836
ASHLAND	02860
ASHVILLE	02908
ATHENS	02956
ATMORE	03004
ATTALLA	03028
AUBURN	03076
AUTAUGAVILLE	03220
AVON	03364
BABBIE	03556
BAILYTOWN	03676
BAKERHILL	03724
BANKS	03940
BAYOU LA BATRE	04084
BAY MINETTE	04660
BEAR CREEK	04852
BEATRICE	04900
BEAVERTON	04948
BELK	05164
BENTON	05692
BERRY	05932
BESSEMER	05980
BILLINGSLEY	06460

CITY	FIPS CODE
BIRMINGHAM	07000
BLACK	07120
BLOUNTSVILLE	07456
BLUE MOUNTAIN	07552
BLUE SPRINGS	07672
BOAZ	07912
BOLIGEE	08104
BON AIR	08248
BRANCHVILLE	08920
BRANTLEY	09016
BRENT	09136
BREWTON	09208
BRIDGEPORT	09328
BRIGHTON	09400
BRILLIANT	09424
BROOKSIDE	09736
BROOKWOOD	09808
BRUNDIDGE	10240
BUTLER	11032
CALERA	11416
CAMDEN	11512
CAMP HILL	11680
CARBON HILL	12016
CARDIFF	12040
CAROLINA	12160
CARROLLTON	12304
CASTLEBERRY	12496
CEDAR BLUFF	12760
CENTRE	13648
CENTREVILLE	13672
CHATOM	14008
CHELSEA	14104
CHEROKEE	14152
CHICKASAW	14392
CHILDERSBURG	14464
CITRONELLE	15064
CLANTON	15136
CLAYHATCHEE	15304
CLAYTON	15376
CLEVELAND	15472

CITY	FIPS CODE
CLIO	15640
COFFEE SPRINGS	16240
COFFEEVILLE	16264
COLLINSVILLE	16600
COLONY	16684
COLUMBIA	16744
COLUMBIANA	16768
COOSADA	17176
CORDOVA	17368
COTTONWOOD	17824
COUNTY LINE	17968
COUNTY LINE	17992
COURTLAND	18040
COWARTS	18088
CREOLA	18304
CROSSVILLE	18856
CUBA	18952
CULLMAN	18976
DADEVILLE	19336
DALEVILLE	19360
DAPHNE	19648
DAUPHIN ISLAND	19744
DAVISTON	19816
DAYTON	19912
DEATSVILLE	20008
DECATUR	20104
DEMOPOLIS	20296
DETROIT	20392
DODGE CITY	20955
DORA	21136
DOTHAN	21184
DOUBLE SPRINGS	21280
DOUGLAS	21328
DOZIER	21448
DUTTON	21952
EAST BREWTON	22216
ELECTRIC	22816
EDWARDSVILLE	23176
ELBA	23296
ELBERTA	23320

CITY	FIPS CODE
ELDRIDGE	23344
ELKMONT	23488
ELMORE	23656
EMELLE	23872
ENTERPRISE	24184
EPES	24256
ETHELSVILLE	24472
EUFAULA	24568
EUNOLA	24616
EUTAW	24664
EVA	24668
EVERGREEN	24808
EXCEL	24880
FAIRFIELD	25120
FAIRHOPE	25240
FAIRVIEW	25384
FALKVILLE	25648
FAUNSDALE	25816
FAYETTE	25840
FIVE POINTS	26200
FLOMATON	26824
FLORALA	26846
FLORENCE	26896
FOLEY	26992
FORKLAND	27376
FORT DEPOSIT	27520
FORT PAYNE	27616
FORT RUCKER	27640
FRANKLIN	28024
FRISCO CITY	28312
FRUITHURST	28432
FULTON	28504
FULTONDALE	28552
FYFFE	28672
GADSDEN	28696
GAINSVILLE	28768
GANTT	28936
GANTTS QUARRY	28984
GARDEN CITY	29032
GARDENDALE	29056

CITY	FIPS CODE
GAYLESVILLE	29296
GEIGER	29392
GENEVA	29464
GEORGIANA	29560
GERALDINE	29608
GILBERTOWN	29704
GLEN ALLEN	29944
GLENCOE	29992
GLENWOOD	30160
GOLDVILLE	30448
GOOD HOPE	30496
GOODWATER	30640
GORDO	30736
GORDON	30760
GOSHEN	30880
GRANT	31096
GRAYSVILLE	31384
GREENSBORO	31720
GREENVILLE	31912
GRIMES	32056
GROVE HILL	32080
GUIN	32224
GULF SHORES	32272
GUNTERSVILLE	32416
GURLEY	32440
GU-WIN	32536
HACKLEBURG	32560
HALEBURG	32656
HALEYVILLE	32704
HAMILTON	32848
HAMMONDVILLE	32896
HANCEVILLE	32968
HARPERSVILLE	33256
HARTFORD	33424
HARTSELLE	33448
HAYDEN	33640
HAYNEVILLE	33712
HEADLAND	33856
HEATH	33904
HEFLIN	33976

CITY	FIPS CODE
HELENA	34024
HENAGER	34096
HIGHLAND LAKE	34480
HILLSBORO	34816
HOBSON CITY	35152
HODGES	35200
HOKES BLUFF	35392
HOLLY POND	35560
HOLLYWOOD	35632
HOMEWOOD	35800
HOOVER	35896
HORN HILL	36088
HUEYTOWN	36448
HUNTSVILLE	37000
HURTSBORO	37096
HYTOP	37264
IDER	37312
INDIAN SPRINGS VILLAGE	37465
IRONDALE	37864
JACKSON	38152
JACKSONS GAP	38248
JACKSONVILLE	38272
JASPER	38416
JEMISON	38608
KANSAS	39280
KENNEDY	39520
KILLEN	39784
KIMBERLY	39856
KINSEY	40072
KINSTON	40096
LAFAYETTE	40672
LAKEVIEW	40888
LANETT	41296
LANGSTON	41380
LEEDS	41968
LEESBURG	42016
LEIGHTON	42160
LESTER	42352
LEVEL PLAINS	42472
LEXINGTON	42640

CITY	FIPS CODE
LIBERTYVILLE	42808
LINCOLN	43120
LINDEN	43240
LINEVILLE	43264
LIPSCOMB	43336
LISMAN	43384
LITTLEVILLE	43648
LIVINGSTON	43720
LOACHAPOKA	43744
LOCKHART	43816
LOCUST FORK	43888
LOUISVILLE	44344
LOWNDESBORO	44536
LOXLEY	44608
LUVERNE	44728
LYNN	44800
MACEDONIA	45316
MCINTOSH	45472
MCKENZIE	45496
MCMULLEN	45640
MADISON	45784
MADRID	45904
MAGNOLIA SPRINGS	46072
MALVERN	46264
MAPLESVILLE	46504
MARGARET	46696
MARION	46768
MAYTOWN	47728
MEMPHIS	48052
MENTONE	48064
MIDFIELD	48376
MIDLAND CITY	48400
MIDWAY	48424
MILLBROOK	48712
MILLPORT	48808
MILLRY	48832
MOBILE	50000
MONROEVILLE	50192
MONTEVALLO	50312
MONTGOMERY	51000

CITY	FIPS CODE
MOODY	51096
MOORESVILLE	51264
MORRIS	51456
MOSSES	51520
MOULTON	51600
MOUNDVILLE	51648
MOUNTAINBORO	51672
MOUTAIN BROOK	51696
MOUNT VERNON	52608
MULGA	52776
MUSCLE SHOALS	53016
MYRTLEWOOD	53112
NAPIER FIELD	53256
NATURAL BRIDGE	53376
NAUVOO	53400
NECTAR	53448
NEEDHAM	53472
NEWBERN	53784
NEW BROCKTON	53856
NEW HOPE	54168
NEW SITE	54432
NEWTON	54480
NEWVILLE	54600
NORTH BIBB	55018
NORTH COURTLAND	55044
NORTH JOHNS	55152
NORTHPORT	55200
NOTASULGA	55440
OAK GROVE	55752
OAK HILL	55824
OAKMAN	55992
ODENVILLE	56400
OHATCHEE	56472
ONEONTA	57000
ONYCHA	57024
OPELIKA	57048
OPP	57120
ORANGE BEACH	57144
ORRVILLE	57240
OWENS CROSS ROADS	57504

CITY	FIPS CODE
OXFORD	57576
OZARK	57648
PAINT ROCK	57696
PARRISH	58272
PELHAM	58848
PELL CITY	58896
PENNINGTON	58968
PETREY	59328
PHENIX CITY	59472
PHIL CAMPBELL	59496
PICKENSVILLE	59592
PIEDMONT	59640
PINCKARD	59832
PINE APPLE	59880
PINE HILL	60240
PINE RIDGE	60372
PISGAH	60720
PLEASANT GROVE	61008
PLEASANT GROVES	61038
POLLARD	61536
POWELLS CROSSROADS	62088
PRATTVILLE	62328
PRICEVILLE	62472
PRICHARD	62496
PROVIDENCE	62688
RAGLAND	63216
RAINBOW CITY	63288
RAINSVILLE	63336
RANBURNE	63408
RED BAY	63576
RED LEVEL	63768
REECE CITY	63984
REFORM	64104
REHOBETH	64152
REPTON	64368
RIDGEVILLE	64656
RIVER FALLS	64776
RIVERSIDE	64920
RIVERVIEW	65016
ROANOKE	65040

CITY	FIPS CODE
ROBERTSDALE	65208
ROCKFORD	65472
ROGERSVILLE	66216
ROSA	66408
RUSSELLVILLE	67056
RUTLEDGE	67176
ST FLORIAN	67536
SAMSON	67800
SAND ROCK	67920
SANFORD	68016
SARALAND	68160
SARDIS CITY	68280
SATSUMA	68352
SCOTTSBORO	68736
SECTION	69000
SELMA	69120
SHEFFIELD	69648
SHILOH	69840
SHORTER	70128
SILAS	70416
SILVERHILL	70536
SIPSEY	70704
SKYLINE	70896
SLOCOMB	71040
SNEAD	71280
SOMERVILLE	71496
SOUTHSIDE	71832
SOUTH VINEMONT	71900
SPANISH FORT	71976
SPRINGVILLE	72600
STEELE	72888

CITY	FIPS CODE
STEVENSON	73080
SULLIGENT	73728
SUMITON	73848
SUMMERDALE	73872
SUSAN MOORE	74160
SWEET WATER	74304
SYLACAUGA	74352
SYVANIA	74400
SYLVAN SPRINGS	74424
TALLADEGA	74592
TALLEDEGA SPRINGS	74616
TALLASSEE	74688
TARRANT	74976
TAYLOR	75096
THOMASTON	75936
THOMASVILLE	75960
THORSBY	76080
TOWN CREEK	76584
TOXEY	76632
TRAFFORD	76680
TRIANA	76824
TRINITY	76872
TROY	76920
TRUSSVILLE	76944
TUSCALOOSA	77256
TUSCUMBIA	77280
TUSKEGEE	77304
UNION	77616
UNION GROVE	77784
UNION SPRINGS	77880
UNIONTOWN	77904

CITY	FIPS CODE
VALLEY	78204
VALLEY HEAD	78240
VANCE	78264
VERNON	78480
VESTAVIA HILLS	78552
VINA	78984
VINCENT	79008
SOUTH VINEMONT	79128
VREDENBURGH	79272
WADLEY	79344
WALDO	79488
WALNUT GROVE	79728
WARRIOR	79944
WATERLOO	80064
WAVERLY	80256
WEAVER	80352
WEBB	80376
WEDOWEE	80496
WEST BLOCKTON	80928
WEST JEFFERSON	81336
WEST POINT	81520
WETUMPKA	81720
WHITE HALL	81912
WILSONVILLE	82848
WILTON	82872
WINFIELD	82992
WOODLAND	83400
WOODVILLE	83664
YELLOW BLUFF	84002
YORK	84096

COUNTY	COUNTY CODE
AUTAUGA	01
BALDWIN	02
BARBOUR	03
BIBB	04
BLOUNT	05
BULLOCK	06
BUTLER	07
CALHOUN	08
CHAMBERS	09
CHEROKEE	10
CHILTON	11
CHOCTAW	12
CLARKE	13
CLAY	14
CLEBURNE	15
COFFEE	16
COLBERT	17
CONECUH	18
COOSA	19
COVINGTON	20
CRENSHAW	21
CULLMAN	22
DALE	23
DALLAS	24
DEKALB	25
ELMORE	26
ESCAMBIA	27
ETOWAH	28
FAYETTE	29
FRANKLIN	30
GENEVA	31
GREENE	32
HALE	33
HENRY	34

COUNTY	COUNTY CODE
HOUSTON	35
JACKSON	36
JEFFERSON	37
LAMAR	38
LAUDERDALE	39
LAWRENCE	40
LEE	41
LIMESTONE	42
LOWNDES	43
MACON	44
MADISON	45
MARENGO	46
MARION	47
MARSHALL	48
MOBILE	49
MONROE	50
MONTGOMERY	51
MORGAN	52
PERRY	53
PICKENS	54
PIKE	55
RANDOLPH	56
RUSSELL	57
ST. CLAIR	58
SHELBY	59
SUMTER	60
TALLADEGA	61
TALLAPOOSA	62
TUSCALOOSA	63
WALKER	64
WASHINGTON	65
WILCOX	66
WINSTON	67

ALABAMA DEPARTMENT OF TRANSPORTATION
BRIDGE IDENTIFICATION NUMBER (BIN) ASSIGNMENT CARD
(FORM BI-1)

NEW STRUCTURE IS TO REPLACE A PREVIOUS STRUCTURE? __ (If replacing existing structure mark "X" otherwise leave blank.)

NEW BIN (Will be assigned by ALDOT Maintenance Bureau):	__ __ __ __ __ __

For 'Under' records, fill in the BIN for the associated 'Route on Structure' (type 1) Record Here: __ __ __ __ __ __

STRUCTURE NUMBER

BI MANUAL PAGE	ITEM		
2-3		BRIDGE STATUS	__
2-3	13A	LRS INVENTORY ROUTE	0 0 0 __ __ __ __ __ __ 0
2-3	13B	LRS INVENTORY ROUTE	__ __
2-4	11	MILE POINT	__ __ __ . __ __
2-4	205	RELATIVE POSITION INDICATOR	__ __
2-4	201	LOCAL IDENTIFIER	__ __ __ __

INVENTORY ROUTE

BI MANUAL PAGE	ITEM		
2-5	5A	RECORD TYPE	__
2-6	5B	ROUTE SIGNING PREFIX	__
2-6	5C	DESIGNATED LEVEL OF SERVICE	__
2-6	5D	ROUTE NUMBER	__ __ __ __ __
2-7	5E	DIRECTIONAL SUFFIX	__
2-8	42A	TYPE OF SERVICE (ON)	__
2-8	42B	TYPE OF SERVICE (UNDER)	__

LOCATION AND OWNERSHIP

BI MANUAL PAGE	ITEM		
2-8	7	FACILITY CARRIED	____________________
2-9	6A	FEATURE INTERSECTED	____________________
2-9	16	LATITUDE	__ __ D __ __ M __ __ . __ __ S
2-9	17	LONGITUDE	0 __ __ D __ __ M __ __ . __ __ S
2-10	2	ALDOT AREA	__ __
2-10		ALDOT DISTRICT	__ __
2-10	3	COUNTY	__ __
2-10	4	CITY/TOWN	__________________
2-10	203	MPO	__________________
2-11	22	OWNER	__ __
2-12	21	MAINTENANCE RESPONSIBILITY	__ __
2-12	293	INSPECTION AGENCY	__ __
2-12	215	PREVIOUS STRUCTURE BIN	__ __ __ __ __ __

NOTE: Item Numbers for bridge data are those as described in the Alabama Department of Transportation Bridge Inspection Manual

Point of Contact Name (Print) :	
Phone Number: (__ __ __) __ __ __ __ __ __ __	Email:
Date: __ __ / __ __ / __ __ __ __	Project Number:

Revised September 2021

Streambed Cross Sections

Insp. Date: __________
Sheet: 1

FORM: BI-4
STR. NUM.: OAL0008 240074.345-1
BIN: 018017   1 REC
Printed: 10/21/2014

IDENTIFICATION

DIVISION: 06   DISTRICT: 05   COUNTY: Dallas

PREVIOUS VALUES: U.S. CUSTOMARY

OFFSET: 20.00   SNDING DATE: 02 2014   VIEW: L   OFST RMRK: FROM C/L
ELEV BASIS: P   LOCATION OF BM: UNKNOWN
ELEV EQ: 0.00 = 0.00   STATION EQ: 0 + 0.0000 = 635 + 82.6000
SND/ELEV IND: S

	CURRENT		NEW	
STATIONS	SND/ELEV	REMARKS	SND/ELEV	REMARKS
0 + 0.0000	8.3500	ABUT #1 R.R.		
0 + 2.7300	8.5500	R.R.		
0 + 16.6100	14.1000	R.R.		
0 + 33.0900	17.3000	BT #2 R.R.		
0 + 50.1800	19.2000	LOW POINT		
0 + 67.1900	17.5500	BT #3 RR		
0 + 84.2100	16.3500			
1 + 1.3000	16.8000	BT #4 RR		
1 + 18.5800	15.6300			
1 + 35.5300	16.0000	BT #5 RR		
1 + 52.4100	15.6600			
1 + 69.5900	15.8000	BT #6 RR		
1 + 87.7200	14.7600			
2 + 3.7700	14.8000	BT #7 RR		
2 + 20.9100	14.2500			
2 + 37.9400	14.4000	BT #8 R.R.		
2 + 54.4700	11.9500	R.R.		
2 + 67.8500	9.2600	R.R.		
2 + 70.9200	9.0000	ABUT #9 R.R.		

Streambed Cross Sections

Insp. Date: __________
Sheet: 2

FORM: BI-4
STR. NUM.: OAL0008 240074.345-1

BIN: 018017 1 REC

Printed: 10/21/2014

IDENTIFICATION

DIVISION: 06 DISTRICT: 05 COUNTY: Dallas

PREVIOUS VALUES: U.S. CUSTOMARY

OFFSET: 20.00 SNDING DATE: 02 2014 VIEW: R OFST RMRK: FROM C/L
ELEV BASIS: P LOCATION OF BM: UNKNOWN
ELEV EQ: 0.00 = 0.00 STATION EQ: 0 + 0.0000 = 635 + 82.6000
SND/ELEV IND: S

	CURRENT		NEW	
STATIONS	SND/ELEV	REMARKS	SND/ELEV	REMARKS
0 + 0.0000	8.0800	ABUT #1 R.R.		
0 + 2.7300	8.9500	R.R.		
0 + 16.6100	12.1200	R.R.		
0 + 33.0900	15.5400	BT #2 R.R.		
0 + 50.1800	16.9000			
0 + 67.1900	16.5000	BT #3		
0 + 84.2100	16.3200			
1 + 1.3000	17.6000	BT #4 RR		
1 + 18.5000	15.7500			
1 + 35.5300	16.5000	BT #5 RR		
1 + 52.4100	15.5600			
1 + 69.6700	16.0000	BT #6 RR		
1 + 86.7200	14.7000			
2 + 3.7700	14.5500	BT #7 RR		
2 + 20.9100	14.0800			
2 + 37.9400	13.8000	BT #8 R.R.		
2 + 54.4700	11.0500	R.R.		
2 + 67.8500	8.9000	R.R.		
2 + 70.9200	8.5400	ABUT #9 R.R.		

Inspection Report38

FORM: BI-5 STR. NUM.: OAL0008 240074.345-1 Sheet: 3

BIN: 018017 1 REC DIVISION: 06 Printed: 10/21/2014

INSPECTION

PREVIOUS INSP: Merrit Ash

PREVIOUS DATE: 09/25/2014 NEW DATE: ____________

PREVIOUS INSP. TYPE: Regular NBI NEW INSP TYPE: ____________

RATING

	CURRENT	NEW
58) DECK RATING	7	____
59) SUPERSTRUCTURE RATING	8	____
60) SUBSTRUCTURE RATING	7	____
61) CHANNEL & CHANNEL PROTECTION	7	____
62) CULVERT RATING	N	____

REMARKS

new inspection

____

____

MISCELLANEOUS

	CURRENT	NEW
71) WATERWAY ADEQUACY	9	____
72) APPROACH ROADWAY ADEQ APPRAISAL	7	____
36) TRAFFIC SAFETY FEATURES		
A) BRIDGE RAIL	1	____
B) TRANSITION	1	____
C) APPROACH RAIL	1	____
D) END TREATMENT	1	____

LOAD POSTING SIGNS:

A) REQUIRED ____________

B) PRESENT ____________

C) VISIBLE ____________

D) LEGIBLE ____________

Inspection Report

FORM: BI-5 STR. NUM.: OAL0008 240074.345-1 Sheet: 1

BIN: 018017 1 REC Printed: 10/21/2014

PREVIOUS DATE: 09/25/2014
NEW DATE: ____________________

STRUCTURE UNIT: 1

	ELEM #	ELEMENT NAME	ENV	QUANTITY	UNITS	QTY CS 1	QTY CS 2	QTY CS 3	QTY CS 4
CURRENT:	**12**	**Re Concrete Deck**	**1**	**11,669**	**sq.ft**	**11,627.00**	**42.00**	**0.00**	**0.00**
NEW:									
NOTES:									
CURRENT:	7358	Concrete Cracking	1	42	sq.ft	0.00	42.00	0.00	0.00
NEW:									
NOTES:									
CURRENT:	**109**	**Pre Opn Conc Girder/Beam**	**1**	**1,632**	**ft**	**1,632.00**	**0.00**	**0.00**	**0.00**
NEW:									
NOTES:	_								
CURRENT:	**215**	**Re Conc Abutment**	**1**	**110**	**ft**	**108.00**	**2.00**	**0.00**	**0.00**
NEW:									
NOTES:									
CURRENT:	7358	Concrete Cracking	1	2	ft	0.00	2.00	0.00	0.00
NEW:									
NOTES:									
CURRENT:	**225**	**Steel Pile**	**1**	**43**	**(EA)**	**43.00**	**0.00**	**0.00**	**0.00**
NEW:									
NOTES:	_								
CURRENT:	**234**	**Re Conc Pier Cap**	**1**	**273**	**ft**	**273.00**	**0.00**	**0.00**	**0.00**
NEW:									
NOTES:	_								
CURRENT:	**304**	**Open Expansion Joint**	**1**	**397**	**ft**	**397.00**	**0.00**	**0.00**	**0.00**
NEW:									
NOTES:	_								
CURRENT:	**310**	**Elastomeric Bearing**	**1**	**96**	**each**	**96.00**	**0.00**	**0.00**	**0.00**
NEW:									
NOTES:	_								

Inspection Report

FORM: BI-5 | STR. NUM.: OAL0008 240074.345-1 | Sheet: 2

BIN: 018017 | 1 REC | Printed: 10/21/2014

PREVIOUS DATE: 09/25/2014
NEW DATE:

CURRENT:	**321**	**Re Conc Approach Slab**	**1**	**1,760**	**sq.ft**	**1,760.00**	**0.00**	**0.00**	**0.00**
NEW:									
NOTES:	_								
CURRENT:	510	Wearing Surfaces	1	1,760	sq.ft	1,760.00	0.00	0.00	0.00
NEW:									
NOTES:	_								
CURRENT:	**331**	**Re Conc Bridge Railing**	**1**	**544**	**ft**	**490.00**	**54.00**	**0.00**	**0.00**
NEW:									
NOTES:									
CURRENT:	7358	Concrete Cracking	1	54	ft	54.00	0.00	0.00	0.00
NEW:									
NOTES:	_								

REASON FOR INSP.

INSPECTOR'S SIGNATURE | DATE | INSP. NBIS CERT NO. | ALA. PROF. ENGR. NO.

REVIEWER'S SIGNATURE | DATE | REVIEWER'S TITLE

Structure Inventory and Appraisal

FORM: BI-6 | STR. NUM.: OAL0008 240074.345-1 | Date: ______________ | Sheet: 6
BIN: 018017 | 1 REC | Printed: 10/21/2014

Appraisal Task

STRUCTURAL APPRAISAL

		CURRENT	NEW
41)	OPEN/POSTED/CLOSED	A Open, no restriction	xxxxxx
72)	APPROACH ALIGNMENT	7 Above Min Criteria	______
36A)	BRIDGE RAILINGS	1 Meets Standards	______
36B)	TRANSITIONS	1 Meets Standards	______
36C)	APPROACH GUARDRAIL	1 Meets Standards	______
36D)	APPROACH GUARDRAIL ENDS	1 Meets Standards	______
111)	PIER PROTECTION	1 Not Required	______
113)	SCOUR CRITICAL	8 Stable Above Footing	______
	FRACTURE CRITICAL DETAILS	No FC Details	______

CALCULATED APPRAISAL RATINGS

		CURRENT	NEW
67)	STRUCTRAL EVALUATION	7 Above Min Criteria	xxxxx
68)	DECK GEOMETRY	7 Above Min Criteria	xxxxx
69)	UNDERCLEARANCES	N Not applicable (NBI)	xxxxx
	SD/FO STATUS	Not Deficient	xxxxx
	SUFFICIENCY RATING	97.80	xxxx.x
	SUFFICIENCY RATING CALCULATE STATUS	0	xxxxx
	HEALTH INDEX	99.83	xxxxx%

CLEARANCES

		CURRENT	NEW
	MINIMUM VERTICAL CLEARANCES		
53)	OVER STRUCTURE	99.99 ft	______ft
54A)	UNDER (REFERENCE)	N Feature not hwy or RR	______
54B)	UNDER CLEARANCE	0.00 ft	______ft
	MINIMUM LATERAL CLEARANCES		
55A)	REFERENCE FEATURE	N Feature not hwy or RR	______
55B)	RIGHT SIDE	0.00 ft	______ft
56)	LEFT SIDE	0.00 ft	______ft
	NAVIGATION DATA		
38)	NAVIGATION CONTROL EXISTS	NA-no waterway	______
39)	NAVIGATION VERTICAL CLEARANCES	0.00 ft	______ft
40)	NAVIGATION HORICONTAL CLEARANCES	0.00 ft	______ft
116)	MINIMUM VERTICAL LIFT CLEARANCES	0.00 ft	______ft

NBI LOAD RATINGS

		CURRENT	NEW
	LOAD RATING REVIEW RECOMMENDED	No	______
	RATING DATE	11/01/2007	xxxxx
31)	DESIGN LOAD	5 MS 18 (HS 20)	xxxxxxx
70)	POSTING	5 At/Above Legal Loads	______
63)	OPERATING TYPE	1 LF Load Factor	______
64)	OPERATING RATING	82.57	______ton
65)	INVENTORY TYPE	1 LF Load Factor	______
66)	INVENTORY RATING	49.50	______ton

Structure Inventory and Appraisal

FORM: BI-6	STR. NUM.: OAL0008 240074.345-1	Date: _______________
BIN: 018017	1 REC	Sheet: 7
		Printed: 10/21/2014

Inventory - Admin Subtask

STRUCTURAL IDENTIFICATION

		CURRENT	NEW
	AGENCY BRIDGE ID	018017	
8)	NBI STRUCTURE NO	018017	
	NAME		____________________

LOCATION

		CURRENT	NEW
1A)	FIPS STATE	01 Alabama	____________________
1B)	FHWA REGION	Region 4-Atlanta	____________________
2)	DIVISION/AREA	Division 6	____________________
3)	COUNTY	Dallas	____________________
4)	CITY/TOWN/PLACECODE		____________________
6A)	FEATURE INTERSECTED	CAHABA RIVER RELIEF NC	____________________
7)	FACLITY CARRIED	US 80 WBL	____________________
9)	LOCATION	5.4 MI. W. OF AL 219	____________________
16)	LATITUDE	32D 26M 41.140S	____D___M____.____S
17)	LONGITUDE	87D 10M 38.940S	____D___M____.____S
98AA)	BORDER STATE	Not Applicable (P)	____________________
98B)	SHARE(%)	0	__________________%
98AB)	BORDER FHWA REGION	Not Applicable	____________________
99)	BORDER STRUCT NO		____________________

AGE AND SERVICE

		CURRENT	NEW
27)	YEAR BUILT	2004	____________________
106)	YEAR RECONSTRUCT	0	____________________
42A)	TYPE OF SERVICE ON	1 Highway	____________________
42B)	UNDER	9 Relief for waterway	____________________
28B)	LANES UNDER	0	____________________

OPERATION

		CURRENT	NEW
21)	MAINT. RESP.	State Highway Agency	____________________
22)	OWNER	State Highway Agency	____________________
	ALDOT DISTRICT	District 5	____________________

CLASSIFICATION INFOMATION

		CURRENT	NEW
112)	NBIS BRIDGE LENGTH	Long Enough	____________________
101)	PARALLEL STRUCTURE	Left of || bridge	____________________
103)	TEMPORARY STRUCTURE	Not Applicable (P)	____________________
37)	HISTORIC SIGNIFICANCE	5 Not eligible for NRHP	____________________

Structure Inventory and Appraisal

FORM: BI-6
STR. NUM.: OAL0008 240074.345-1
BIN: 018017 1 REC

Date: ______________
Sheet: 8
Printed: 10/21/2014

Inventory - Design Subtask

DECK

		CURRENT	NEW
107)	DECK STRUCTURE TYPE	1 Concrete-Cast-in-Place	____________
108A)	DECK SURFACE TYPE	1 Monolithic Concrete	____________
108B)	DECK MEMBRANE TYPE	0 None	____________
108C)	DECK PROTECTION	None	____________
50A)	CURB SIDEWALK WIDTH/LEFT	0.00 ft	____________ft
50B)	CURB SIDEWALK WIDTH/RIGHT	0.00 ft	____________ft
52)	DECK WIDTH	42.90 ft	____________ft
33)	BRIDGE MEDIAN	1 Open median	____________
	DECK AREA	11,668.80	____________(SF)

STRUCTURE STATUS

	CURRENT	NEW
BRIDGE STATUS	3 Active	____________

SPANS

		CURRENT	NEW
45)	NUMBER OF MAIN SPANS	13	____________
43A)	MAIN SPANS MATERIAL	1 Concrete	____________
43B)	MAIN SPANS DESIGN	02 Stringer/Girder	____________
46)	NUMBER OF APPROACH SPANS	0	____________
44A)	APPROACH SPAN MATERIAL	Not Applicable (P)	____________
44B)	APPROACH SPAN DESIGN	Not Applicable (P)	____________
34)	SKEW	0 D	____________D
35)	STRUCTURE FLARED	0 No flare	____________

LENGTH

		CURRENT	NEW
48)	MAXIMUM SPAN LENGTH	34.00 ft	____________ft
49)	STRUCTURE LENGTH	272.00 ft	____________ft
	TOTAL LENGTH	272.00 ft	____________ft

Structure Inventory and Appraisal

FORM: BI-6
STR. NUM.: OAL0008 240074.345-1
BIN: 018017   1 REC

Date: _______________
Sheet: 9
Printed: 10/21/2014

Inventory - Roads Subtask

IDENTIFICATION

		CURRENT	NEW
	ROAD/ROUTE NAME	US 80 WBL	________
5A)	POSITION/PREFIX	Route On Structure	________
5B)	KIND HWY (RT PREFIX)	2 U.S. Numbered Hwy	________
5C)	DESIG. LEVEL SERVICE	1 Mainline	________
5D)	RTE#	00080	________
5E)	SUFFIX	0 N/A (NBI)	________
6B)	CRITICAL FACILITY	* Defense-critical	________

HIGHWAY NETWORKS & SERVICE CLASSIFICATION

		CURRENT	NEW
11)	KILOMETER/MILE POINT	74.345 mi	________mi
12)	NATIONAL BASE NET	On Base Network	________
13A)	LRS INVENTORY RTE	000AL00080	________
13B)	SUB#	00	________
20)	TOTAL FACILITY	3 On free road	________
26)	FUNCTIONAL CLASS	02 Rural Other Princ	________
102)	TRAFFIC DIRECTION	1 1-way traffic	________

TRAFFIC

		CURRENT	NEW
28A)	LANES	2	________
	SPEED	0 mph	________mph
29)	RECENT ADT	2,755	________
30)	YEAR	2011	________
109)	TRUCK %	26%	________%
114)	FUTURE ADT	4,515	________
115)	FUT. YEAR	2031	________

ALTERNATE CLASSIFICATIONS

		CURRENT	NEW
100)	DEFENSE HIGHWAY	2 On Non-Interstate STRA	________
104)	NAT. HWY. SYSTEM	1 On the NHS	________
105)	FED. LANDS HWY	0 N/A (NBI)	________
110)	NAT. TRUCK NETWORK	1 Part of natl network	________
	SCHOOL BUS RTE	No	[ ]
	TRANSIT RTE	No	[ ]
	EMERGENCY RTE	No	[ ]
	NBI RTE	Yes	[ ]

Structure Inventory and Appraisal

FORM: BI-6
STR. NUM.: OAL0008 240074.345-1
BIN: 018017   1 REC

Date: _______________
Sheet: 10
Printed: 10/21/2014

Inventory - Roads Subtask

CLEARANCES

		CURRENT	NEW
10)	VERTICAL	99.99 ft	__________________ft
47)	HORIZONTAL	40.00 ft	__________________ft

WIDTHS

		CURRENT	NEW
32)	APPROACH ROAD	40.00 ft	__________________ft
51)	ROADWAY	40.00 ft	__________________ft

DETOURS

		CURRENT	NEW
19)	LENGTH	1.00 mi	__________________mi

Structure Inventory and Appraisal

FORM: BI-6
STR. NUM.: OAL0008 240074.345-1
Date: _______________
Sheet: 11
BIN: 018017   1 REC
Printed: 10/21/2014

Inventory - Identification Subtask

AGENCY IDENTIFICATION

		CURRENT	NEW
201)	LOCAL IDENTRIFIER	NNNN	____________
215)	PREVIOUS STRUCTURE BIN(s)	1034	____________
298)	REPLACEMENT BIN	0	____________
214)	ADJACENT MAINLINE BIN	12754	____________
205)	RELATIVE POSITION INDICATOR	-1	____________
203)	MPO CODE	Not in an MPO	____________
206)	CONGRESSIONAL DISTRICT	07	____________
207)	SENATE DISTRICT	23	____________
208)	HOUSE DISTRICT	067	____________
297)	LOCAL COMMISSION DISTRICT	0000	____________
294)	BRIDGE NAME / DESIGNATOR		____________
210)	CPMS REFERENCE NUMBER	100002894	____________
292)	PROJECT NUMBER	BRF-0008(513)	____________
	ALABAMA ID	OAL0008 240074.345-1	____________
	ALDOT REGION		____________

INSPECTION

		CURRENT	NEW
293)	INSPECTION AGENCY	State Highway Agency	____________
	SPECIAL INSPECTION COUNT	4	____________
92D)	SPECIAL INSPECTION TYPE	N/A	____________
92D)	SPECIAL INSPECTION TYPE	N/A	____________
92D)	SPECIAL INSPECTION TYPE	N/A	____________
92D)	SPECIAL INSPECTION TYPE	N/A	____________
	SPECIAL EQUIPMENT COUNT	0	____________
222)	SPECIAL EQUIPMENT USED		____________
222)	SPECIAL EQUIPMENT USED		____________
222)	SPECIAL EQUIPMENT USED		____________
222)	SPECIAL EQUIPMENT USED		____________
222)	SPECIAL EQUIPMENT USED		____________
222)	SPECIAL EQUIPMENT USED		____________
222)	SPECIAL EQUIPMENT USED		____________
218)	TOTAL EMP-HRS FOR UNDERWATER INSP	0	____________
219A)	SNOOPER INSP REQUIRED	Snooper Insp. Not Req'd	____________
219B)	SNOOPER INSP FREQUENCY	0	____________
220)	LAST SNOOPER INSPECTION DATE	01/01/1900	____/____/____
224A)	SCOUR INSPECTION REQUIRED	Scour Monit. Req'd	____________
224B)	SCOUR INSPECTION FREQUENCY	24 mo	____________mo
224C)	SPECIAL INSPECTION DETAIL INDICATOR	Snooper Insp. Not Req'd	____________
225A)	SCOUR COUNTERMEASURES REQUIRED	Scour Counterm Not Req'd	____________
225B)	SCOUR COUNTERMEASURES PLANNED	01/01/1900	____/____/____
225C)	SCOUR COUNTERMEASURES COMPLETED	01/01/1900	____/____/____
113)	SCOUR CRITICAL	8 Stable Above Footing	____________
113B)	SCOUR CRITICAL BRIDGE DESCRIPTION	Eval Based on Scour Cal	____________
	FOUNDATION TYPE	Pile	____________
	FOUNDATION ELEVATION	Known	____________
	STREAMBED MATERIAL	Clay/Loam	____________

Structure Inventory and Appraisal

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BIN: 018017 | 1 REC | Sheet: 12 | Printed: 10/21/2014

Inventory - Identification Subtask

AGENCY LOAD RATING

		CURRENT	NEW
41)	STRUCTURE TRAFFIC STATUS	A Open, no restriction	____________________
70)	POSTING	5 At/Above Legal Loads	____________________
63)	OPERATING RATING TYPE	1 LF Load Factor	____________________
64)	OPERATING RATING	82.57	_________________ton
65)	INVENTORY RATING TYPE	1 LF Load Factor	____________________
66)	INVENTORY RATING	49.50	_________________ton
249)	RATING SPECIFICATION USED	LFD	____________________
250A)	RATING ANALYSIS PERFORMED MAJOR	AASHTO BrR (Virtis)	____________________
		Not Rated / Analyzed	____________________
251)	RATING AGENCY	ALDOT (Maint. Bureau)	____________________
252)	DATE RATED	11/01/2007	xxxxxxxx
253)	RATING STATUS	Rating Published	____________________
		No Action	____________________
		No Action	____________________
254A)	LOAD TYPE H	57.32	_________________ton
254B)	LOAD TYPE TWO-AXLE	73.96	_________________ton
254C)	LOAD TYPE TRI-AXLE DUMP	73.85	_________________ton
254D)	LOAD TYPE CONCRETE TRUCK	67.14	_________________ton
254E)	LOAD TYPE 18 WHEELER	98.21	_________________ton
254F)	LOAD TYPE SIX-AXLE	98.21	_________________ton
254G)	LOAD TYPE SCHOOL BUS	63.53	_________________ton
257)	REASON POSTED	Superstructure	____________________
		None / Condition Noted	____________________
258A	LAST POST CHANGE REASON	Never Posted	____________________
258B	LAST POST CHANGE DATE	01/01/1900	______/______/_______
259)	POSTING CHART INDICATOR	Leave Off Posting Chart	____________________
261)	DATE OF TEMPORARY STRENGTHENING	01/01/1900	______/______/_______
262)	TYPE OF TEMPORARY STRENGTHENING	None	____________________
		None	____________________
265)	STANDARD DRAWINGS MAIN SPAN	00000000000000000	____________________
266)	STANDARD DRAWING SPPROACH SPAN	NNNNNNNNNNNNNNNNN	____________________
31)	LIVE LOAD	5 MS 18 (HS 20)	____________________

Structure Inventory and Appraisal

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Inventory - State Items Subtask

CULVERT

		CURRENT	NEW
237)	CULVERT TYPE	Not Applicable	______
233A)	NUMBER OF BARRELS OR PIPES	0	______
233B)	BARREL LENGTH	0.00 ft	______ft
233C)	BARREL SPAN	0.00 ft	______ft
233D)	BARREL HEIGHT	0.00 ft	______ft
233E)	DEPTH OF FILL	0.00 ft	______ft

TYPE

		CURRENT	NEW
232)	HORIZONTAL AND/OR VERTICAL CURVE	Horizontal Curve	______
240A)	FRACTURE CRITICAL STRUCTURE GROUP TYPE	Not Applicable	______
244A)	BEGIN ABUTMENT TYPE	Spill-Through Abutment	______
244B)	BEGIN ABUTMENT CAP MATERIAL	Reinforced Concrete	______
244C)	BEGIN ABUTMENT CAP TYPE	Cast in Place	______
244D)	BEGIN ABUTMENT FOUNDATION	Steel H-Piles	______
245A)	ENDING ABUTMENT TYPE	Spill-Through Abutment	______
245B)	ENDING ABUTMENT CAP MATERIAL	Reinforced Concrete	______
245C)	ENDING ABUTMENT CAP TYPE	Cast in Place	______
245D)	ENDING ABUTMENT FOUNDATION	Steel H-Piles	______
246A)	MAIN SPAN PIER MATERIAL PRIMARY	Reinforced Concrete	______
	MAIN SPAN PIER MATERIAL SECONDARY	Not Applicable	______
246B)	MAIN SPAN PIER TYPE PRIMARY	5 or + Column Pier Bent	______
	MAIN SPAN PIER TYPE SECONDARY	Not Applicable	______
246C)	MAIN SPAN PIER CAP MATERIAL PRIMARY	Reinforced Concrete	______
	MAIN SPAN PIER CAP MATERIAL SECONDARY	Not Applicable	______
246D)	MAIN SPAN PIER CAP STRUCTURE PRIMARY	Cast-in-Place	______
	MAIN SPAN PIER CAP STRUCTURE SECONDARY	Not Applicable	______
246E)	MAIN SPAN PIER FOUNDATION TYPE PRIMARY	Steel H-Piles	______
	MAIN SPAN PIER FOUNDATION TYPE SECONDARY	Not Applicable	______
247A)	APPROACH SPAN PIER MATERIAL PRIMARY	Not Applicable	______
	APPROACH SPAN PIER MATERIAL SECONDARY	Not Applicable	______
247B)	APPROACH SPAN PIER TYPE PRIMARY	Not Applicable	______
	APPROACH SPAN PIER TYPE SECONDARY	Not Applicable	______
247C)	APPROACH SPAN PIER CAP MATERIAL PRIMARY	Not Applicable	______
	APPROACH SPAN PIER CAP MATERIAL SEC.	Not Applicable	______
247D)	APPROACH SPAN PIER CAP STRUCTURE PRIM.	Not Applicable	______
	APPROACH SPAN PIER CAP STRUCTURE SEC.	Not Applicable	______
247E)	APPROACH SPAN PIER FOUNDATION TYPE PRIM.	Not Applicable	______
	APPROACH SPAN PIER FOUNDATION TYPE SEC.	Not Applicable	______

PAINT

		CURRENT	NEW
267)	DATE LAST PAINTED	01/01/1900	____/____/____
271A)	PRIMER PAINT TYPE	Not Applicable	______
271B)	INTERMEDIATE PAINT TYPE	Not Applicable	______
271C)	FINISH PAINT TYPE	Not Applicable	______
271D)	UNDERCOAT PAINT TYPE	Not Applicable	______
273)	PAINT EXTENT	Not Applicable	______
274)	PAINT COST	0.00	______

Structure Inventory and Appraisal

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INSPECTION

		CURRENT
90)	INSPECTION DATE	9/25/2014
91)	FREQUENCY	24 mo
93A)	FC INSPECTION DATE	N/A
92A)	FC FREQUENCY	
93B)	UW INSPECTION DATE	N/A
92B)	UW FREQUENCY	
93C)	SI DATE	N/A
92C)	SI FREQUENCY	

CONDITION

		CURRENT
58)	DECK	7 Good
59)	SUPER	8 Very Good
60)	SUB	7 Good
61)	CHANNEL/CHANNEL PROTECTION	7 Minor Damage
62)	CULVERT	N N/A (NBI)

BRIDGE REPLACEMENT

	CURRENT
PROGRAM YEAR	0
PRIORITY	F
LOAD DEFICIENCY POINTS	0.0000
WIDTH DEFICIENCY POINTS	0.0000
VERT. CIR. DEFICIENCY POINTS	0.0000
CONDITION DEFICIENCY POINTS	0.0000
TOTAL DEFICIENCY POINTS	0.0000
LOCAL RANK	736
STATEWIDE RANK	5,576

INSPECTOR'S SIGNATURE   DATE   INSP. NBIS CERT NO.   or   ALA. PROF. ENGR. NO.

REVIEWER'S SIGNATURE   DATE   REVIEWER'S TITLE

Bridge Maintenance Estimate

FORM: BI-9 STR. NUM.: OAL0008 240074.345-1 Sheet: 1
BIN: 018017 1 REC Printed: 10/21/2014

INSPECTED BY: ______________________ DATE: __________

REVIEWED BY: ______________________ DATE: __________

ACT CODE	DESCRIPTION	UNITS	QTY	PRIORITY	STAT
B41	DRAIN/JOINT CLEANING	HR	10.00	Medium	

NC:______ REMARK: MIN DEBRIS ON ABUT CAPS & BENT CAP NEED CLEAING
C:______ NEW QTY: __________ NEW PRIORITY:__________

NEW REMARK:______________________

NEW ACTIVITY: B: __________ ACTIVITY DESCRIPTION: __________
UNIT: __________ QTY: __________ PRIORITY: __________
NEW REMARK: ______________________

NEW ACTIVITY: B: __________ ACTIVITY DESCRIPTION: __________
UNIT: __________ QTY: __________ PRIORITY: __________
NEW REMARK: ______________________

NEW ACTIVITY: B: __________ ACTIVITY DESCRIPTION: __________
UNIT: __________ QTY: __________ PRIORITY: __________
NEW REMARK: ______________________

NEW ACTIVITY: B: __________ ACTIVITY DESCRIPTION: __________
UNIT: __________ QTY: __________ PRIORITY: __________
NEW REMARK: ______________________

General Narrative Form

FORM: BI-13	STR. NUM.: OAL0008 240074.345-1	Sheet: 1
BIN: 018017	1 REC	Printed: 10/21/2014

USER ID	DATE	TYPE	COMMENTS
Pontis	07/26/2004	A	MCT ITEM 200 BEFORE = P ITEM 200 AFTER = O
Pontis	05/04/2006	S	DLP THE HARD CLAY MARL LAYER DEPICTED ON THE SOUNDINGS IS ERODABLE UNDER CERTAIN CONDITIONS, BUT IT IS EXPECTED TO ERODE AT A VERY SLOW RATE. NORMAL MONITORING ON A 2-YEAR INTERVAL SHOULD SHOW SIGNS OF SCOUR BEFORE THIS STRUCTURE WOULD BECOME SCOUR CRITICAL. IF SCOUR PROGRESSES BELOW THE TOP OF THE INDICATED HARD CLAY MARL LAYER, THE BRIDGE SCOUR SECTION SHOULD BE NOTIFIED IMMEDIATELY FOR FURTHER EVALUATION.

Appendix E – Bridge Inspection Program Compliance

BRIDGE INSPECTION REVIEW AND VALIDATION PROCEDURES

The state of Alabama is comprised of five ALDOT regions, ten areas, sixty-seven counties, and approximately 150 municipalities responsible for maintaining and inspecting public road bridge structures. Central Office personnel from the Maintenance Bureau and Local Transportation Bureau have the responsibility to review and validate inspection reports and inventory data.

Bridge Inspection Reviews will be held at three to four areas each year, so that every three years all ten areas will have their bridge inspection program reviewed. All county and municipal bridge owners must attend their respective area's review. While at the ALDOT area review, Central Office personnel will perform office and field reviews on half of the county offices within the area. By visiting half the counties during each area review, all 67 counties will be reviewed every six years. In addition to the area and county reviews, central office personnel will perform field and office reviews at several municipalities on a priority basis.

The reviews will focus on validation of inspection reports, inventory data, and the overall program within the respective agencies. For each agency, an office review and a field review shall be performed according to the frequency defined above. The review shall be documented by Central Office personnel from the Maintenance Bureau and Local Transportation Bureau. After the review a letter will be sent to the respective bridge owner stating if they are in compliance or not. In this letter all identified discrepancies shall be documented and a date will be set for the owner to correct any remaining non-compliance issues.

For all the county and municipal bridge owners whose offices are not visited while in the area, an BrM and Questionnaire review will be performed by Maintenance Bureau personnel. The findings of this BrM and Questionnaire review will be documented in a letter as outlined above and sent to the agency involved.

Office Review

This review will be conducted by Central Office personnel at the bridge owner's facilities. The items to be examined for adherence to federal and state policy and guidelines shall include, but are not limited to, the following:

- General Bridge Information
- Inspection Personnel
  - Qualifications
- Inspection Procedures
  - Hands on
  - Scheduling (check for past due)
  - Coding Inspection Forms
  - Review of Inspection Forms
- Interim Inspections
  - Frequency
- Maintenance and repair recommendations documentation
  - Emergency or urgent
  - Follow-up process and procedures

- Rating and Posting
  - Availability of Rating and Posting Information
  - Placement and verification of Posting Signs
- Scour
  - Channel Cross-sections
  - Plot and Review scour information
  - Plan of Action for Scour Critical Bridges
- Critical Findings
  - Proper notifications
  - Documentation of work performed
  - Follow-up Inspections
- Bridge Files
  - Required Lists
    - Underwater Inspection
    - Snooper or Lift truck
    - Fracture Critical
    - Interim Inspection
    - Posted Structures
    - Scour or Hydraulics Problems
    - Deck Condition Graded 3 or less
    - Superstructure Condition Graded 3 or less
    - Substructure Condition Graded 3 or less
    - Culvert Condition Graded 3 or less
    - Waterway Adequacy Graded 3 or less
  - Contents
    - Scour Plan of Action (shall be placed at the top of the bridge file)
    - Inspection Reports (BI-4, BI-5, BI-6, BI-8, BI-9)
    - Posting Information
    - Rating Information
    - Scour Plots
    - Photographs
    - Scour Reports
    - Underwater Bridge Inspection Reports

Field Review
This review will be conducted by Central Office personnel at various structures owned by the agency being reviewed. The items to be examined for adherence to federal and state policy and guidelines shall include, but are not limited to, the following:

- Inspection Reports
  - Accurate representation of field conditions
  - Inventory data
  - Adherence to NBI and ALDOT coding guidelines
- Posting Signs
  - Signs are present and visible
  - Accuracy of posted weight limits

BrM and Questionnaire Review

This review will be conducted by the Maintenance Bureau at the Central Office. This review is based on the Bridge Inspection Program Compliance Review Questionnaire that is required to be submitted at the area review. The items to be examined for adherence to federal and state policy and guidelines shall include, but are not limited to Bridge Inspection Program Compliance Review Questionnaires, the Federally Required Structures List, and other BrM reports.

BRIDGE INSPECTION PROGRAM
COMPLIANCE REVIEW QUESTIONNAIRE

Alabama Department of Transportation
Maintenance Bureau

Bridge Owning Agency:

____

In an effort to fully comply with Federal Code and with FHWA Guidelines, the Maintenance Bureau is required to conduct regular bridge inspection program compliance reviews. This questionnaire will be used to review procedures, personnel, and documentation associated with your bridge inspection program.

The bridge owner (Area Maintenance Engineer, County Engineer, City Engineer, etc.) and their NBIS certified bridge inspector must complete this questionnaire. All questions must be answered accurately and completely. Once the questionnaire has been completed please sign and date it below.

OWNER'S NAME*: ____
TITLE: ____
ALABAMA PE REGISTRATION NO.: ___________________________
NBIS CERTIFICATION NO.: _________________________________

SIGNATURE: ____
DATE: ____

INSPECTOR'S NAME**: _____________________________________
TITLE: ____
ALABAMA PE REGISTRATION NO.: ___________________________
NBIS CERTIFICATION NO.: _________________________________

SIGNATURE: ____
DATE: ____

* Owner refers to the person representing the agency that owns the bridges and is in a position of responsibility to direct the associated maintenance activities.

** Inspector refers to the person who has the primary responsibility for performing bridge inspections on behalf of the owning agency.

Please complete and bring this form with you to the area bridge inspection compliance review meeting.

The following BrM reports should be printed and reviewed when preparing the Bridge Inspection Program Compliance Review Questionnaire. Use Item 21, Maintenance Responsibility, when applicable in generating the reports listed below.

1. Structure Sounding Report
2. Structure Inspection Planning Report
3. Federally Required Lists
4. Bridge Identification Cross Reference List
5. Bridge Posting Reports
6. Inspection Summary
7. Bridge Rating Inventory Reports
8. FHWA Edit Report

I. General

1. Do you have an updated copy of the Federally Required Structure Lists on hand?

   ____

2. Indicate the number of structures (and corresponding deck area) for which you are responsible:

   1. __________ - Total Structures: ______________ Sq. Ft.
   2. __________ - Total Active Bridges: ______________ Sq. Ft.
   3. __________ - Total Active Culverts: ______________ Sq. Ft.

3. List the personnel you use during bridge inspections:

	NAME	CBI NO.	PE NO.	2 Day Sch	2 Wk Sch
1.	______________	________	_______	_________	_________
2.	______________	________	_______	_________	_________
3.	______________	________	_______	_________	_________
4.	______________	________	_______	_________	_________
5.	______________	________	_______	_________	_________
6.	______________	________	_______	_________	_________
7.	______________	________	_______	_________	_________
8.	______________	________	_______	_________	_________

4. List any training needs which the owner's bridge inspectors may have.
   (Two-Week Bridge School, NHI Course, Other)

   ____

   ____

   ____

II. Underwater

1. Indicate the number of structures (and corresponding deck area) requiring underwater inspections:

   __________ - Underwater inspections: ______________ Sq. Ft.

2. List the names of underwater inspectors who inspect your bridges:

	NAME	CBI NO.	PE NO.	Date 3 Day Sch	Date 2 Wk Sch
1.	________________	_________	________	_________	__________
2.	________________	_________	________	_________	__________
3.	________________	_________	________	_________	__________
4.	________________	_________	________	_________	__________

3. Do you ensure that an owner's qualified bridge inspector is present and oversees the underwater inspection and the underwater inspector is NBIS certified?

   ____

4. Do you ensure that a detailed Underwater Inspection report is completed at the time of the inspection?

   ____

5. Is the Underwater Inspection report signed by the underwater inspector with their qualifications?

   ____

III. Equipment

1. Indicate the number of structures for which you are responsible:

   1. __________ - Snooper or lift truck inspections

   2. __________ - Special scaffold or special ladder

2. Please check the major equipment that you use during your bridge inspections. If you check a piece of equipment for using it, please check whether you own or borrow/rent the piece of equipment.

	USE	OWN	BORROW/RENT
Vehicle	☐	☐	☐
Snooper/Reach-All	☐	☐	☐
Lift Truck/Man Lift	☐	☐	☐
Platform	☐	☐	☐
Boat	☐	☐	☐
Ladder, Special	☐	☐	☐
Ladder, Extension	☐	☐	☐

3. Do you require equipment either difficult to obtain or not available?

____

____

IV. Inspection Procedures

1. Do your bridge inspectors perform “hands-on” inspections? Explain.

____

____

2. Briefly describe the systematic procedures your inspectors use at a typical bridge.

____

____

V. Inspection Scheduling

1. Do you receive the monthly e-mail of the Structure Planning Report, and do you use it to schedule your bridge inspections? If not, please explain.

____

____

2. Describe how you track which scheduled inspections have not been completed?

   ____

   ____

3. Do you have any overdue inspections? If so, please provide a copy of the Structure Planning Report and a reason why the inspection is overdue.

   ____

   ____

4. During your last inspection cycle, were all of your inspections performed on time? If not, please explain.

   ____

   ____

VI. Coding Bridge Inspections Forms

1. List all the forms coded by your inspector at the time of the inspection.

   ____

   ____

2. After performing the inspection, how long (typically) does it take to enter the inspection data into BrM?

   ____

   ____

3. Identify the person in your organization who signs the BI-5, BI-6, and repair needed forms.

   ____

   ____

4. Identify the person in your organization who reviews the BI-5, BI-6, and repair needed forms.

   ____

5. Do you receive the weekly email of the FHWA Edit Report?

____

6. Do you review the weekly FHWA Edit Report and correct the errors identified?

____

____

VII. Interim Inspections

1. Indicate the number of structures for which you are responsible:

   1. __________ - Interim inspections (“On-NHS”)

   2. __________ - Interim inspections (“Off-NHS”)

2. Please attach a list of bridges requiring interim inspections.

____

____

3. Do the interim inspection frequencies on the list above satisfy the ALDOT Guidelines for Operation?

____

VIII. Documenting and Reporting Maintenance and Repair Needs

1. Do you document bridge maintenance and repair needs discovered during bridge inspections (example: BI-9, Workorder) and include this documentation in the bridge file?

____

2. Describe the process you use to document bridge maintenance work that has been completed, and identify work that has not been performed in a timely manner.

____

____

3. Describe the process you use to document and give emphasis to Bridge Maintenance work classified as High.

____

____

4. Do you perform follow-up observations to evaluate and ensure that Bridge Maintenance work classified as High is adequately performed? If yes, please describe.

____

____

5. Describe the process used to inspect underwater repair/maintenance work when completed.

____

____

IX. Bridge Rating and Posting

1. Indicate the number of structures for which you are responsible:

   1. __________ - Posted

   2. __________ - Structures with Temporary Structure Indicated

2. Who performs your load ratings? If someone other than ALDOT performs your load ratings, list the name of the person and their P.E. #.

____

____

3. Do you post structures in accordance with recommendations from the Bridge Rating and Load Testing Office of the ALDOT Maintenance Bureau? Explain:

____

____

4. At structures for which posting has been recommended, how long (typically) is it before posting signs are erected?

____

____

5. Do you receive the monthly e-mail for Structures Recommended for Posting?

____

6. Describe the process you use to verify that posting signs are in place:

____

____

7. Have you sent Load Rating Information (Plans and/or Data Sheets) to the Bridge Rating and Load Testing Office for all new and existing structures in your inventory?

____

8. Have you notified ALDOT when a structure falls into one of the categories identified below? This documentation must be in the form of a letter showing the bridge identification number (BIN) and must identify the means to be taken to assure the safety of the traveling public.

	Yes	No	Not Applicable at this time
Deck condition graded 4 or less	☐	☐	☐
Superstructure condition graded 4 or less	☐	☐	☐
Substructure condition graded 4 or less	☐	☐	☐
Culvert condition graded 4 or less	☐	☐	☐
Channel condition graded 3 or less	☐	☐	☐
Bridge is closed	☐	☐	☐

9. Have you notified ALDOT when any significant repairs are made to a structure that falls into one of the categories identified below? This documentation must be in the form of a letter showing the bridge identification number (BIN) and the repairs performed.

	Yes	No	Not Applicable at this time
Deck condition graded 4 or less is raised	☐	☐	☐
Superstructure condition graded 4 or less is raised	☐	☐	☐
Substructure condition graded 4 or less is raised	☐	☐	☐
Culvert condition graded 4 or less is raised	☐	☐	☐
Channel condition graded 3 or less is raised	☐	☐	☐
Bridge is reopened	☐	☐	☐

10. Before a closed bridge is reopened, do you ensure the structure is inspected by a certified bridge inspector?

____

X. Scour

1. Indicate the number of structures for which you are responsible:

    1. __________ - Structures Requiring Scour Evaluations

    2. __________ - Scour or hydraulic problems

2. Have you notified the ALDOT Bridge Scour Section when there are scour or hydraulic problems at a structure?

____

3. Have you notified the ALDOT Bridge Scour Section when any repairs are made to correct scour or hydraulic problems?

____

4. Have you submitted all information required to perform a Scour Evaluation to the Bridge Scour Section? Please note, for each bridge that you have not submitted, you are required to develop a Scour Plan of Action (POA).

____

____

5. For all your bridges subject to Scour have you entered bridge details as well as all pile driving / footing records into BrM?

____

____

6. Do you take channel cross-sections upstream and downstream, record this data on the BI-4 Form and enter this data into BrM?

____

____

7. After each inspection, do you **plot** and **review** channel cross sections to check for errors in the data collected, and to assure that no potentially catastrophic scour or hydraulic problems are developing?

____

____

8. Do you have a Plan of Action (POA) available and ready to implement for each scour critical bridge? If so, please give an explanation of how POAs are used in your organization.

____

____

9. Is your Plan of Action (POA) attached to your summary of scour evaluation and placed at the top of your bridge file?

____

____

XI. Fracture Critical

1. Indicate the number of fracture critical structures for which you are responsible:

   __________ - Fracture critical

2. Please explain how your fracture critical members are identified in your bridge file:

____

____

XI. Bridge Files

1. Do you maintain a separate, complete, and up to date file for each bridge?

____

2. Do you keep the bridge files in the owner's office?

____

3. Do your bridge files contain the following items:

	Yes	No	Not Applicable at this time
BI-4	☐	☐	☐
BI-5	☐	☐	☐
BI-6	☐	☐	☐
Plots (Channel Cross-Section)	☐	☐	☐
Photographs	☐	☐	☐
Maintenance or Repair Needed Forms	☐	☐	☐
Maintenance or Repair Performed	☐	☐	☐
Documentation of Interim Inspection	☐	☐	☐
Rating Information (Rating Data Sheets or Plans)	☐	☐	☐
Posting Information (Rating Result Sheets or Posting Chart)	☐	☐	☐
Correspondence pertaining to the structure	☐	☐	☐
Documentation when the posting signs were erected	☐	☐	☐
Scour Evaluation	☐	☐	☐
Scour Plan of Action (POA)	☐	☐	☐
Underwater Inspection	☐	☐	☐
Identification of Fracture Critical Members	☐	☐	☐

ALABAMA DEPARTMENT OF TRANSPORTATION

ALDOT/FHWA Bridge Inspection Program Review

Bridge Inspection Folder Checklist

Owner: ______________________ **Date:** ______________

BIN: ______________

Str Num: ______________________ **By:** ______________

Photographs:	Y	N	______
Bridge Card:	Y	N	______
Rating Information:	Y	N	______
Scour Evaluation Report:	Y	N	______
Underwater Inspection Report:	Y	N	______
Posting Information:	Y	N	______

BI-5	Date	Signed?	Reviewed?	
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______

BI-6	Date	Signed?	Reviewed?	
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______

BI-4	Date	
	______	______
	______	______
	______	______
	______	______

BI-8	Date	Signed?	Reviewed?	
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______

BI-9	Date	Signed?	Reviewed?	
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______
	______	Y N	Y N	______

PLOTS	Date		
	______	Y N	______
	______	Y N	______
	______	Y N	______
	______	Y N	______

NOTES

______

______

______

______

______

______

APPENDIX F: UNDERWATER INSPECTION FIELD REFERENCE

UNDERWATER INSPECTIONS

WHAT TO IDENTIFY

The following list is a basic guide of what to look for when inspecting underwater structures for ALDOT. Most structures inspected by our divers will fall into one or more categories described. If not, the bridge inspector, construction supervisor, or diving supervisor will determine procedures and areas that need to be inspected. This guide is to be used for inspection dives only and does not cover all situations.

Some basic information to for on <u>all</u> structures are:

- Amount of structure exposed (Compare with as-built plans)
- Scour (Local, general, undermining, rip-rap or other protection - missing or moved)
- Bottom Type
- Water Depth
- Previous Repairs

More Specific information is contained in the following list.

I. Piers

- Shafts, columns, stems, web walls, diaphragms, footings; look for:
    - Cracks, scale, spalls, voids, debris, collision damage, chemical attack, rust stains, efflorescence
        - Report length, width, penetration, orientation, rebar exposed, aggregate exposed
        - Report where web wall and diaphragms stop
        - Footings: Report amount exposed above mud line. If voids are found under footing, measure and probe for piles. If piles are exposed, note number, type and length. Make drawing, use inspection forms or video if necessary. Check for forms around footings. Note material and condition. Exposed footings are more susceptible to scour problems. Check for rip-rap. If none found, does footing need protection?

II. Pile Bents

- Steel (note size of pile); Look for:

    - Corrosion and deterioration. Report amount of oxide coating. Clean off area and report amount and depth of pitting. Check edge of flanges for squareness. Check splices and cross member connections, especially around weld and bolts. Check thickness with ultrasonic thickness gauge.

    - If encased, note amount encased below waterline and amount of steel exposed. Measure horizontal dimensions of encasement for future rehabilitation work. (Usually can be done above waterline.)

- Concrete

    - Check length exposed.

    - Check and report cracks, scale, spalls, voids, collision damage, chemical attack and exposed rebar.

- Timber

    - Check length exposed.

    - Check for marine borers, decay, damage, bacterial degradation, marine growth, splices, and connectors. Note: Splash zone and mud line are two prime areas of deterioration.

- All Pile Bents

    - If deterioration is present, determine percent of section loss.

III. Abutments

- Determine material and inspect like any other concrete, timber, or steel structure. Things to look for include:

    - Loss of fill material; especially around wing walls

    - If sheet piles are used, check interlocks for splits.

    - Voids under toe

IV. Protection Devices

- Dolphins, fenders, protection cells. Determine material and inspect like other concrete, steel or timber structure. Other things to look for include:

    - Loss of fill if sheet pile is used
    - Voids under toes
    - Collision damage
    - Connectors
    - Missing members
    - If mooring lines or mooring cable are found, remove if possible and report to inspector. Do not remove cables that are part of the structure.
    - Rip-rap.

V. Cofferdams

Things to check:

- Interlocks
- Walers
- Elevation of floor mud line especially at corners and along inside wall
- Mud line elevation around exterior of cell
- Floor material
- Floor condition
- Exposed toes
- Placement of rebar if required

VI. Culverts

Find out type, dimensions and flow directions before entering.

- Intake and discharge
  - Check for scour under the toe wall and wing walls
  - Check concrete or steel condition
  - Check for debris buildup or potential debris buildup (beaver dams)
  - Check bottom for potential scour problems
- Interior
  - Check dimensions
  - Check depth and type of material on floor
  - Check for cracks and voids
  - Check drains
  - Check joints of misalignment and settling
- Note: Extra precautions should be taken when entering culverts, because of the confining nature and potential dangers form trapped gases and dangerous marine life.

STATE OF ALABAMA

ALABAMA DEPARTMENT OF TRANSPORATION

GUIDELINES FOR OPERATION

SUBJECT: INTERIM INSPECTIONS ON BRIDGES

An **interim inspection** is defined as an inspection at least every 12 months; or more often if deemed necessary by the owner's bridge inspector, the Emergency Bridge Inspection team, or the appropriate Guideline for Operation. An interim inspection must be thorough enough to determine the condition of the bridge but may otherwise be limited to an inspection and review of the elements and/or components of the bridge which originally required the interim inspection.

In order for the Department to conform to the requirements set forth in the National Bridge Inspection Standards (NBIS) and FHWA guidelines, the Department's Guidelines for Operation require that bridges which fall into any of the following categories **must** be reported immediately to the Maintenance Bureau **and must** have interim inspections.

a) bridges with condition grade of 4 or less for the deck, superstructure, substructure or culvert.

b) bridge with condition grade of 3 or less for channel condition or waterway adequacy.

c) bridges which are posted.

The above requirements are effective immediately for all bridges requiring interim inspections.

RECOMMEND FOR APPROVAL: G H Conner
BUREAU CHIEF/DIVISION ENGINEER

APPROVAL: D W Vaughn
CHIEF ENGINEER

APPROVAL: D M M
TRANSPORTATION DIRECTOR

9-9-2008
DATE

5-18.1 Rev. 9/08

STATE OF ALABAMA

ALABAMA DEPARTMENT OF TRANSPORATION

GUIDELINES FOR OPERATION

SUBJECT: DECK, SUPERSTRUCTURE, SUBSTRUCTURE, CULVERT OR CHANNEL CONDITION GRADE OF 1 OR 2

Any bridge with a deck, superstructure, substructure, culvert or channel condition grade of 1 or 2 **shall** be closed. In the case of a deck, superstructure, substructure, culvert or channel with a condition grade of 1 or 2 the Division **must** notify the Maintenance Bureau, the County **must** notify County Transportation Bureau and the Municipality **must** notify the division bridge inspector. Before the bridge can be re-opened to traffic, the owner **must** have a professional review to determine if the bridge **must** remain closed or if the bridge **may** be re-opened to traffic with a three ton gross load limit and with interim inspections at least every 30 days. Upon request, the Emergency Bridge Inspection Team **may** be available to perform the review. The bridge owner **must** submit in writing to their respective contacts listed above, its recommendations for correcting the deficiencies.

The above requirements are effective immediately for all bridges with a deck, superstructure, substructure, culvert or channel condition grade of 1 or 2.

RECOMMEND FOR APPROVAL: GH Conner

BUREAU CHIEF/DIVISION ENGINEER

APPROVAL: [signature]

CHIEF ENGINEER

APPROVAL: [signature]

TRANSPORTATION DIRECTOR

9·9·2008

DATE

STATE OF ALABAMA

ALABAMA DEPARTMENT OF TRANSPORATION

GUIDELINES FOR OPERATION

SUBJECT: DECK, SUPERSTRUCTURE, SUBSTRUCTURE, CULVERT OR CHANNEL CONDITION GRADE OF 3

Any bridge with a deck, superstructure, substructure, culvert or channel condition grade of 3 **shall** be posted for a three ton gross load limit. In the case of a deck, superstructure, substructure, culvert or channel with a condition grade of 3 the Division **must** notify the Maintenance Bureau, the County **must** notify County Transportation Bureau and the Municipality **must** notify the division bridge inspector. If the bridge is load posted, then it **must** have an interim inspection at least every 90 days, or more often if deemed necessary by the owner's bridge inspector. Any exception to the 3 Ton load posting **must** have a professional review to determine the load-carrying capacity and the appropriate interim inspection frequency, not to exceed 90 days. Upon request, the Emergency Bridge Inspection team **may** be available to perform the professional review. The bridge owner **must** submit in writing to their respective contacts listed above, its recommendations for correcting the deficiencies.

The above requirements are effective immediately for all bridges with a deck, superstructure, substructure, culvert or channel condition grade of 3.

RECOMMEND FOR APPROVAL: GH Conner
BUREAU CHIEF/DIVISION ENGINEER

APPROVAL: Don Vaughn
CHIEF ENGINEER

APPROVAL: DM Ying
TRANSPORTATION DIRECTOR

9·9·2008
DATE

Rev. 9/08

STATE OF ALABAMA

ALABAMA DEPARTMENT OF TRANSPORTATION

GUIDELINES FOR OPERATION

SUBJECT: DECK, SUPERSTRUCTURE, SUBSTRUCTURE OR CULVERT CONDITION GRADE OF 4

Any bridge with a deck, superstructure, substructure or culvert condition grade of 4 **shall** be load rated to determine the load carrying capacity. In the case of a deck, superstructure, substructure or culvert with a condition grade of 4 the Division **must** notify the Maintenance Bureau, the County **must** notify County Transportation Bureau and the Municipality **must** notify the division bridge inspector. The deck, superstructure, substructure or culvert **must** be load rated within 6 months of the date of inspection which revealed the condition grade of 4, and it **must** be placed on a maximum of 12 month interim inspection. If the structure has not been load rated or had a professional review within six months, then the bridge **must** be gross load posted for one-half of its design operating rating and **must** have an interim inspection at least every 12 months, or more often if deemed necessary by the owner's bridge inspector. A professional review **may** determine the priority for load rating the structure and for the appropriate level of gross load posting. Upon request, the Emergency Bridge Inspection team **may** be available to perform this review. The bridge owner **must** submit in writing to their respective contacts listed above, its recommendations for correcting the deficiencies.

Where the deck, superstructure, substructure or culvert is load rated, the bridge shall be load posted for the least rating.

RECOMMEND FOR APPROVAL: ______________________
BUREAU CHIEF/DIVISION ENGINEER

APPROVAL: ______________________
CHIEF ENGINEER

APPROVAL: ______________________
TRANSPORTATION DIRECTOR

9-9-2008
DATE

STATE OF ALABAMA

ALABAMA DEPARTMENT OF TRANSPORTATION

GUIDELINES FOR OPERATION

SUBJECT: AUTHORITY TO CLOSE BRIDGE

Bridge inspectors qualified under the National Bridge Inspection Standards (NBIS) for certification **shall** have the authority to close any bridge, which in the opinion of the inspector, presents a clear and immediate danger to the safety of the traveling public.

The bridge closing **may** be immediate in that all traffic is stopped, re-routed, or detoured with little or no notice. If safety and circumstances permit, the closing **may** be planned so that signing and other provisions are completed before the bridge is closed.

As soon as possible after the decision has been made to close the bridge, the bridge inspector **shall** notify both the appropriate local authorities (division, county, city, etc.) and the Maintenance Bureau. The Maintenance Bureau **shall** also be notified as to the time, date, and reason for closing the bridge.

Upon request, the Emergency Bridge Inspection Team **shall** review the circumstances concerning the bridge closing in order to determine if the bridge should remain closed and to consider any other relative information.

The above requirements are effective immediately.

RECOMMEND FOR APPROVAL: ______________________________
BUREAU CHIEF/DIVISION ENGINEER

APPROVAL: ______________________
CHIEF ENGINEER

APPROVAL: ______________________ 9 · 9 · 2008
TRANSPORTATION DIRECTOR DATE

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
12	**Reinforced Concrete Deck**	AREA - ft2	Deck	NBE
	Description - This element defines all reinforced concrete bridge decks regardless of the wearing surface or protection systems used. **Quantity Calculation** - The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.			
13	**Prestressed Concrete Deck**	AREA – ft2	Deck	NBE
	Description – This element defines all prestressed concrete bridge decks regardless of the wearing surface or protection systems used. **Quantity Calculation** – The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.			
15	**Prestressed Concrete Top Flange**	AREA - ft2	Deck	NBE
	Description -- This element defines all prestressed bridge girder top flanges where traffic rides directly on the structural element regardless of the wearing surface or protection systems used. These bridge types include bulb-tees, box girders and girders that require traffic to ride on the top flange. **Quantity Calculation** - The quantity for this element includes the area of the top flange from edge to edge including any median areas and accounting for any flares or ramps present. This quantity is for the top flange riding surface only. Girder web and bottom flange to be evaluated by the appropriate girder element.			
16	**Reinforced Concrete Top Flange**	AREA – ft2	Deck	NBE
	Description – This element defines all reinforced concrete bridge girder top flanges where traffic rides directly on the structural element regardless of the wearing surface or protection systems used. These bridge types include tee-beams, box girders, and girders that require traffic to ride on the top flange. **Quantity Calculation** – The quantity for this element includes the area of the top flange from edge to edge including any median areas and accounting for any flares or ramps present. This quantity is for the top flange riding surface only. Girder web and bottom flange to be evaluated by the appropriate girder element.			
28	**Steel Deck with Open Grid**	AREA - ft2	Deck	NBE
	Description -- This element defines all open grid steel bridge decks with no fill. **Quantity Calculation** - The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.			
29	**Steel Deck with Concrete Filled Grid**	AREA - ft2	Deck	NBE
	Description - This element defines steel bridge decks with concrete fill either in all of the openings or within the wheel tracks. **Quantity Calculation** - The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.			
30	**Steel Deck Corrugated / Orthotropic / Etc.**	AREA - ft2	Deck	NBE
	Description - This element defines those bridge decks constructed of corrugated metal filled with portland cement, asphaltic concrete, or other riding surfaces. Orthotropic steel decks are also included. **Quantity Calculation** - The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.			
31	**Timber Deck**	AREA - ft2	Deck	NBE
	Description - This element defines all timber bridge decks regardless of the wearing surface or protection systems used. **Quantity Calculation** - The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
38	**Reinforced Concrete Slab**	AREA - ft2	Slab	NBE
	Description – This element defines all reinforced concrete bridge slabs regardless of the wearing surface or protection systems used. **Quantity Calculation** – The quantity for this element includes the area of the slab from edge to edge including any median areas and accounting for any flares or ramps present.			
54	**Timber Slab**	AREA - ft2	Slab	NBE
	Description – This element defines all timber bridge slabs regardless of the wearing surface or protection systems used. **Quantity Calculation** – The quantity for this element includes the area of the slab from edge to edge including any median areas and accounting for any flares or ramps present.			
60	**Other Deck**	AREA - ft2	Deck	NBE
	Description – This element defines all bridge decks constructed of other materials regardless of the wearing surface or protection systems used. **Quantity Calculation** – The quantity for this element includes the area of the deck from edge to edge including any median areas and accounting for any flares or ramps present.			
65	**Other Slab**	AREA - ft2	Slab	NBE
	Description – This element defines all slabs constructed of other materials regardless of the wearing surface or protection systems used. **Quantity Calculation** – The quantity for this element includes the area of the slab from edge to edge including any median areas and accounting for any flares or ramps present.			
102	**Steel Closed Web / Box Girder**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all steel box girders or closed web girders, and is for all box girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the number of girders multiplied by the span length.			
104	**Prestressed Concrete Closed Web / Box Girder**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all pretensioned or post-tensioned concrete closed web girders or box girders, and is for all box girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the number of girders multiplied by the span length.			
105	**Reinforced Concrete Closed Web / Box Girder**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all reinforced concrete box girders or closed web girders, and is for all box girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the number of girders multiplied by the span length.			
106	**Other Closed Web / Box Girder**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all other material box girders or closed web girders, and is for all other material box girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the number of girders multiplied by the span length.			
107	**Steel Open Girder / Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all steel open girders, and is for all girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all lengths of each girder.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
109	**Prestressed Concrete Open Girder / Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines pretensioned or post-tensioned concrete open web girders, and is for all girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all the lengths of each girder.			
110	**Reinforced Concrete Open Girder / Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines mild steel reinforced concrete open web girders, and is for all girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each girder.			
111	**Timber Open Girder / Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all timber open girders, and is for all girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all the lengths of each girder / beam.			
112	**Other Open Girder / Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all other material girders, and is for all girders regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all the lengths of each girder.			
113	**Steel Stringer**	LENGTH– ft	Superstructure	NBE
	Description – This element defines steel members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each stringer.			
115	**Prestressed Concrete Stringer**	LENGTH– ft	Superstructure	NBE
	Description – This element defines pretensioned or post-tensioned concrete members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each stringer.			
116	**Reinforced Concrete Stringer**	LENGTH– ft	Superstructure	NBE
	Description – This element defines mild steel reinforced concrete members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each stringer.			
117	**Timber Stringer**	LENGTH– ft	Superstructure	NBE
	Description – This element defines timber members that support the deck in a stringer floor beam system, and is for all stringers regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each stringer.			
118	**Other Stringer**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all other material stringers, and is for all stringers regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all the lengths of each stringer.			
120	**Steel Truss**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all steel truss elements, including all tension and compression members for through and deck trusses. It is for all trusses regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinally along the travel way.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
135	**Timber Truss**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all timber truss elements, including all tension and compression members for through and deck trusses. It is for all trusses regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinally along the travel way.			
136	**Other Truss**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all other material truss elements, including all tension and compression members, and through and deck trusses. It is for all other material trusses regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each truss panel measured longitudinally along the travel way.			
141	**Steel Arch**	LENGTH– ft	Superstructure	NBE
	Description – This element defines steel arches regardless of type, and is for all arches regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.			
142	**Other Arch**	LENGTH– ft	Superstructure	NBE
	Description –This element defines other material arches regardless of type, and is for all other material arches regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.			
143	**Prestressed Concrete Arch**	LENGTH– ft	Superstructure	NBE
	Description – This element defines only pretensioned or post-tensioned concrete arches, and is for all arches regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the length of each arch panel measured longitudinally along the travel way.			
144	**Reinforced Concrete Arch**	LENGTH– ft	Superstructure	NBE
	Description – This element defines only mild steel reinforced concrete arches, and is for all arches regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.			
145	**Masonry Arch**	LENGTH– ft	Superstructure	NBE
	Description – This element defines masonry or stacked stone arches, and is for all arches regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each arch section measured longitudinally along the travel way.			
146	**Timber Arch**	LENGTH– ft	Superstructure	NBE
	Description – This element defines only timber arches, and is for all arches regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each arch panel measured longitudinally along the travel way.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
147	**Steel Main Cables**	LENGTH– ft	Superstructure	NBE
	Description – This element defines all steel main suspension or cable stay cables not embedded in concrete. It is for all cable groups regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each main cable measured longitudinally along the travel way. **Element Commentary** – This element is intended for use on main cables in suspension bridges or main cable stays in cable stayed bridges. Suspender cables or other smaller cables shall be captured using the secondary cable element.			
148	**Secondary Steel Cables**	EACH	Superstructure	NBE
	Description – This element defines all steel suspender cables not embedded in concrete. It is for all individual or cable groups regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the individual cable or cable groups carrying the load from the superstructure to the main cable / arch elements. **Element Commentary** – This element is intended for use on suspender cables, other smaller cables or groups of cables in one location acting as a system to carry loads from the superstructure to the main cable / arch. Suspension bridge main cables or cable stays shall be captured using the steel main cable element.			
149	**Other Secondary Cable**	EACH	Superstructure	NBE
	Description – This element defines all other material cables not embedded in concrete. It is for all individual other material cables or cable groups regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the individual cable or cable groups carrying the load from the superstructure to the main cable / arch elements.			
152	**Steel Floor Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines steel floor beams that typically support stringers, and is for all floor beams regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each floor beam.			
154	**Prestressed Concrete Floor Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines prestressed concrete floor beams that typically support stringers, and is for all floor beams regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each floor beam.			
155	**Reinforced Concrete Floor Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines mild steel reinforced concrete floor beams that typically support stringers, and is for all floor beams regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each floor beam.			
156	**Timber Floor Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines timber floor beams that typically support stringers, and is for all floor beams regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each floor beam.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
157	**Other Floor Beam**	LENGTH– ft	Superstructure	NBE
	Description – This element defines other material floor beams that typically support stringers, and is for all floor beams regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of all of the lengths of each floor beam.			
161	**Steel Pin and Pin & Hanger Assembly or Both**	EACH	Superstructure	NBE
	Description - This element defines steel pins and pin and hanger assemblies and is for all assemblies regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of pins, pin and hanger assemblies, or both.			
162	**Steel Gusset Plate**	EACH	Superstructure	NBE
	Description – This member defines only those steel gusset plate(s) connections that are on the main truss / arch panel(s). These connections can be constructed with one or more plates that may be bolted, riveted, or welded. This element is for all gusset plates regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the number of primary load path gusset plate assemblies. For multiple plate gusset connections at a single panel point, the quantity shall be one gusset plate regardless of the number of individual plates at the single connection point.			
202	**Steel Column**	EACH	Substructure	NBE
	Description – This element is for all steel columns regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of columns.			
203	**Other Column**	EACH	Substructure	NBE
	Description – This element is for all other material columns regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of columns.			
204	**Prestressed Concrete Column**	EACH	Substructure	NBE
	Description – This element is for all prestressed concrete columns regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of columns.			
205	**Reinforced Concrete Column**	EACH	Substructure	NBE
	Description - This element is for all reinforced concrete columns regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of columns.			
206	**Timber Column**	EACH	Substructure	NBE
	Description – This element is for all timber columns regardless of protective system. **Quantity Calculation** – The quantity of this element is the number of columns.			
207	**Steel Tower**	LENGTH– ft	Substructure	NBE
	Description – This element defines steel built up or framed tower supports, and is for all towers regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the heights of built up or framed tower supports. **Element Commentary** – This element is intended to be used for truss framed tower supports or built up steel towers. This element is intended to capture large supports and towers associated with suspension bridges, cable stayed bridges, moveable bridges, or similar structural configurations.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
208	**Timber Trestle**	LENGTH– ft	Substructure	NBE
	Description – This element defines framed timber supports, and is for all timber / trestle towers regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the heights of built up or framed tower supports. **Element Commentary** – This element is intended to be used for truss framed trestle or towers. This element is intended to capture large supports and towers associated with large deck truss bridges.			
210	**Reinforced Concrete Pier Wall**	LENGTH– ft	Substructure	NBE
	Description – This element defines reinforced concrete pier walls, and is for all pier walls regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the lengths of the pier walls measured along the skew angle.			
211	**Other Pier Wall**	LENGTH– ft	Substructure	NBE
	Description – This element defines those pier walls constructed of other materials. This is for all pier walls regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the lengths of the pier walls measured along the skew angle.			
212	**Timber Pier Wall**	LENGTH– ft	Substructure	NBE
	Description – This element defines those timer pier walls that include pile, timber sheet material, and filler. this is for all pier walls regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the length of the pier walls measured along the skew angle.			
213	**Masonry Pier Wall**	LENGTH– ft	Substructure	NBE
	Description – This element defines those pier walls constructed of block or stone. The block or stone may be placed with or without mortar. This is for all pier walls regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the wall lengths measured along the skew angle.			
215	**Reinforced Concrete Abutment**	LENGTH– ft	Substructure	NBE
	Description – This element defines reinforced concrete abutments. This includes the material retaining the embankment and monolithic wingwalls and abutment extensions. This is for all reinforced concrete abutments regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the width of the abutment with monolithic wingwalls and abutment extensions measured along the skew angle.			
216	**Timber Abutment**	LENGTH– ft	Substructure	NBE
	Description – This element defines timber abutments. This includes the sheet material retaining the embankment, integral wingwalls, and abutment extensions. This is for all abutments regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the width of the abutment with integral wingwalls and abutment extensions measured along the skew angle.			
217	**Masonry Abutment**	LENGTH– ft	Substructure	NBE
	Description – This element defines those abutments constructed of block or stone, including integral wingwalls and abutment extensions. The block or stone may be placed with or without mortar. This is for all abutments regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the width of the abutment with integral wingwalls and abutment extensions measured along the skew angle.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
218	**Other Abutments**	LENGTH– ft	Substructure	NBE
	Description – This element defines other material abutment systems. This includes the sheet material retaining the embankment, and integral wingwalls and abutment extensions. This is for all abutments regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the width of the abutment with integral wingwalls and abutment extensions measured along the skew angle.			
219	**Steel Abutment**	LENGTH– ft	Substructure	NBE
	Description – This element defines steel abutments. This includes the sheet material retaining the embankment, and monolithic wingwalls and abutment extensions. This is for all abutments regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the width of the abutment with monolithic wingwalls and abutment extensions measured along the skew angle.			
220	**Reinforced Concrete Pile Cap / Footing**	LENGTH– ft	Substructure	NBE
	Description – This element defines reinforced concrete pile caps / footings that are visible for inspection. Pile caps / footings exposed from erosion or scour or visible during an underwater inspection are included in this element. The exposure may be intentional or caused by erosion or scour. **Quantity Calculation** – The quantity of this element is the sum of the length of footings or pile caps along the skew angle.			
225	**Steel Pile**	EACH	Substructure	NBE
	Description – This element defines steel piles that are visible for inspection. Piles exposed from erosion or scour and piles visible during an underwater inspection are included in this element. This element is for all steel piles regardless of protective systems. **Quantity Calculation** – The quantity for this element is the sum of the number of piles visible for inspection.			
226	**Prestressed Concrete Pile**	EACH	Substructure	NBE
	Description – This element defines prestressed concrete piles that are visible for inspection. Piles exposed from erosion or scour and piles visible during an underwater inspection are included in this element. This element is for all prestressed concrete piles regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of piles visible for inspection.			
227	**Reinforced Concrete Pile**	EACH	Substructure	NBE
	Description – This element defines reinforced concrete piles that are visible for inspection. Piles exposed from erosion or scour and piles visible during an underwater inspection are included in this element. This element is for all reinforced concrete piles regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of piles visible for inspection.			
228	**Timber Pile**	EACH	Substructure	NBE
	Description – This element defines timber piles that are visible for inspection. Piles exposed from erosion or scour and piles visible during an underwater inspection are included in this element. This element is for all timber piles regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of piles visible for inspection.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
229	**Other Pile**	EACH	Substructure	NBE
	Description – This element defines other material piles that are visible for inspection. Piles exposed from erosion or scour and piles visible during an underwater inspection are included in this element. This element is for all other material piles regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the number of piles visible for inspection.			
231	**Steel Pier Cap**	LENGTH– ft	Substructure	NBE
	Description – This element defines those steel pier caps that support girders and transfer load into piles or columns, and is for all steel pier caps regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the cap lengths measured along the skew angle.			
233	**Prestressed Concrete Pier Cap**	LENGTH– ft	Substructure	NBE
	Description – This element defines those prestressed concrete pier caps that support girders and transfer load into piles or columns and is for all caps regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the cap lengths measured along the skew angle.			
234	**Reinforced Concrete Pier Cap**	LENGTH– ft	Substructure	NBE
	Description – This element defines those reinforced concrete pier caps that support girders and transfer load into piles, or columns and is for all pier caps regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the cap length measured along the skew angle.			
235	**Timber Pier Cap**	LENGTH– ft	Substructure	NBE
	Description – This element defines those timber pier caps that support girders that transfer load into piles, or columns and is for all timber pier caps regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the pier cap lengths measured along the skew angle.			
236	**Other Pier Cap**	LENGTH– ft	Substructure	NBE
	Description – This element defines other material pier caps that support girders that transfer load into piles or columns, and is for all other material pier caps regardless of protective system. **Quantity Calculation** – The quantity for this element is the sum of the pier cap lengths measured along the skew angle.			
240	**Steel Culvert**	LENGTH– ft	Culvert	NBE
	Description – This element defines steel culverts, including arched, round, or elliptical pipes. **Quantity Calculation** – The quantity for this element is the flow line length of the barrel times the number of barrels.			
241	**Reinforced Concrete Culvert**	LENGTH– ft	Culvert	NBE
	Description – This element defines reinforced concrete culverts, including box, arched, round, or elliptical shapes. **Quantity Calculation** - The quantity for this element is the flow line length of the barrel times the number of the barrels.			
242	**Timber Culvert**	LENGTH– ft	Culvert	NBE
	Description – This element defines all timber culverts. **Quantity Calculation** – The quantity of this element is the flow line length of the barrel times the number of barrels.			
243	**Other Culvert**	LENGTH– ft	Culvert	NBE
	Description – This element defines other material type culverts, including arches, round, or elliptical pipes. These culverts are not included in steel, concrete, or timber material types. **Quantity Calculation** – The quantity of this element is the flow line length of the barrel times the number of barrels.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
244	**Masonry Culvert**	LENGTH– ft	Culvert	NBE
	Description – This element defines masonry block or stone culverts. **Quantity Calculation** – The quantity for this element is the flow line length of the barrel times the number of barrels.			
245	**Prestressed Concrete Culvert**	LENGTH– ft	Culvert	NBE
	Description – This element defines all prestressed concrete culverts. **Quantity Calculation** – The quantity for this element is the flow line length of the barrel times the number of barrels.			
300	**Strip Seal Expansion Joint**	LENGTH– ft	Joints	BME
	Description – This element defines those expansion joint devices which utilize a neoprene type waterproof gland with some type of metal extrusion or other system to anchor the gland. **Quantity Calculation** – The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.			
301	**Pourable Joint Seal**	LENGTH– ft	Joints	BME
	Description – This element defines those joints filled with a pourable seal with or without a backer. **Quantity Calculation** – The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.			
302	**Compression Joint Seal**	LENGTH– ft	Joints	BME
	Description – This element defines only those joints filled with a preformed compression type seal. This joint may or may not have an anchor system to confine the seal. **Quantity Calculation** – The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.			
303	**Assembly Joint With Seal**	LENGTH– ft	Joints	BME
	Description – This element defines only those joints filled with an assembly mechanism that has a seal. **Quantity Calculation** – The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.			
304	**Open Expansion Joint**	LENGTH– ft	Joints	BME
	Description – This element defines only those joints that are open and not sealed. **Quantity Calculation** – The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.			
305	**Assembly Joint Without Seal**	LENGTH– ft	Joints	BME
	Description – This element defines only those assembly joints that are open and not sealed. This includes finger and sliding plate joints. **Quantity Calculation** – The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.			
306	**Other Joint**	LENGTH– ft	Joints	BME
	Description – This element defines only those other joints that are not defined by any other joint element. **Quantity Calculation** – The quantity for this element is determined by summing all the lengths of the joint measured along the skew angle.			
310	**Elastomeric Bearing**	EACH	Bearings	NBE
	Description – This element defines only those bridge bearings that are constructed primarily of elastomers, with or without fabric or metal reinforcement. **Quantity Calculation** – The quantity is the sum of each bearing of this type.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
311	**Movable Bearing**	EACH	Bearings	NBE
	Description – This element defines only those bridge bearings which provide for both rotation and longitudinal movement by means of roller, rocker, or sliding mechanisms. **Quantity Calculation** – The quantity is the sum of each bearing of this type.			
312	**Enclosed / Concealed Bearing**	EACH	Bearings	NBE
	Description – This element defines only those bridge bearings that are enclosed so that they are not open for detailed inspection. **Quantity Calculation** – The quantity is the sum of each bearing of this type. **Element Commentary** – This element should be used for box girder hinges. In cases where the bearing material is not visible, the inspector shall assess the condition based on alignment, grade across the joint, persistence of debris, or other indirect indicators of the condition.			
313	**Fixed Bearing**	EACH	Bearings	NBE
	Description – This element defines only those bridge bearings that provide for rotation only (no longitudinal movement). **Quantity Calculation** – The quantity is the sum of each bearing of this type.			
314	**Pot Bearing**	EACH	Bearings	NBE
	Description – This element defines those high load bearings with 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. **Quantity Calculation** – The quantity is the sum of each bearing of this type.			
315	**Disc Bearing**	EACH	Bearings	NBE
	Description – This element defines those high load bearings with a hard plastic disk. This bearing may be fixed against horizontal movement, guided to allow movement in one direction, or floating to allow sliding in any direction. **Quantity Calculation** – The quantity is the sum of each bearing of this type.			
316	**Other Bearing**	EACH	Bearings	NBE
	Description – This element defines all other material bridge bearings regardless of translation or rotation constraints. **Quantity Calculation** – The quantity is the sum of each bearing of this type.			
320	**Prestressed Concrete Approach Slab**	AREA - ft2	Approach Slabs	BME
	Description – This element defines those structural sections, between the abutment and the approach pavement, that are constructed of prestressed (post-tensioned) reinforced concrete. **Quantity Calculation** – The quantity for this element should include the area of the approach slab(s) from edge to edge including any median areas and accounting for any flares or ramps present.			
321	**Reinforced Concrete Approach Slab**	AREA - ft2	Approach Slabs	BME
	Description – This element defines those structural sections, between the abutment and the approach pavement, that are constructed of mild steel reinforced concrete. **Quantity Calculation** – The quantity for this element should include the area of the approach slab(s) from edge to edge including any median areas and accounting for any flares or ramps present.			
330	**Metal Bridge Railing**	LENGTH– ft	Bridge Rails	NBE
	Description – This element defines all types and shapes of metal bridge railing. Steel, aluminum, metal beam, rolled shapes, etc. will all be considered part of this element. Included in this element are the posts of metal, timber or concrete, blocking, and curb. **Quantity Calculation** – The quantity for this element is the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.			

El. No.	Element Name/Description	Units	Element Category	NBE/BME ADE/DF
331	**Reinforced Concrete Bridge Railing**	LENGTH– ft	Bridge Rails	NBE
	Description – This element defines all types and shapes of reinforced concrete bridge railing. All elements of the railing must be concrete. **Quantity Calculation** – The quantity for this element is the number or rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.			
332	**Timber Bridge Railing**	LENGTH– ft	Bridge Rails	NBE
	Description – This element defines all types and shapes of timber bridge railing. Included in this element are the posts of timber, metal or concrete, blocking, and curb. **Quantity Calculation** – The quantity for this element is the number of rows of bridge rail times the length of the bridge. The quantity for this element includes only the rail on the bridge.			
333	**Other Bridge Railing**	LENGTH– ft	Bridge Rails	NBE
	Description – This element defines all types and shapes of bridge railing except those defined as metal, concrete, timber, or masonry. **Quantity Calculation**-The quantity for this element is the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.			
334	**Masonry Bridge Railing**	LENGTH– ft	Bridge Rails	NBE
	Description – This element defines all types and shapes of masonry block or stone bridge railing. All elements of the railing must be masonry block or stone. **Quantity Calculation** – The quantity for this element is the number of rows of bridge rail times the length of the bridge. The element quantity includes only the rail on the bridge.			
510	**Wearing Surfaces**	AREA - ft2	Wearing Surface	BME
	Description – This element is for all decks / slabs that have overlays made with flexible (asphaltic concrete), semi rigid (epoxy and polyester material), rigid (portland cement) materials and timber running planks. **Quantity Calculation**- The quantity for this element should include the area of the deck / slab that is protected by this wearing surface.			
515	**Steel Protective Coating**	AREA - ft2	Protective System	BME
	Description – This element is for steel elements that have a protective coating such as paint, galvanization, weathering steel patina or other top coat steel corrosion inhibitor. **Quantity Calculation** – The quantity for this element should include the entire protected surface of the steel element.			
520	**Concrete Reinforcing Steel Protective System**	AREA - ft2	Protective System	BME
	Description – This element defines all types of protective systems used to protect reinforcing steel in concrete elements from corrosion. **Quantity Calculation** – The quantity for this element should include the entire surface area of the protected element. **Element Commentary** – This protection system element is intended to capture situations where the concrete element may be expected to deteriorate at a rate that is slower than unprotected situations. Protection systems may include rebar coatings, cathodic protection, or other similar protection methods. Wearing surfaces are addressed under the appropriate wearing surface element and not this element.			
521	**Concrete Protective Coating**	AREA - ft2	Protective System	BME
	Description – 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 top coat barrier that protects concrete from deterioration and reinforcing steel from corrosion. **Quantity Calculation** – The quantity for this element should include the entire protected surface of the concrete element.			

Bridge Defects

In this manual, the element represents the aggregate condition of the defined element inclusive of all defects. Element defects are to be used when the element's condition reaches state 2 or lower and essentially act to break down the overall element condition into one or more specific observed problems. The defects defined within this manual shall always assume the units of the element that they are associated with. In some cases, multiple defects may operate in the same defined space. In this case, the inspector shall report the defect in the most severe conditions state. If two defects in the same condition state operate in the same defined space, the inspector shall determine the predominate defect for reporting. For example, if a reinforced concrete bridge deck is cracked throughout and also has a spall in a portion of the deck, the spalling would likely be determined to be the predominate defect.

Defect	Definition	Materials
Corrosion 1000	This defect is used to report corrosion of metal and other material elements.	Steel and Other
Cracking 1010	This defect is used to report fatigue cracking in metal and other material elements.	Steel and Other
Connection 1020	This defect is used to report connection distress in metal and other material elements.	Steel, Timber and Other
Delamination / Spall / Patched Area 1080	This defect is used to report spalls, delamination and patched areas in concrete, masonry and other material elements.	PSC, RC, Masonry, and Other
Exposed Rebar 1090	This defect is used to report exposed conventional reinforcing steel in reinforced and prestressed concrete elements.	PSC and RC
Exposed Prestressing 1100	This defect is used to report exposed prestressing steel in concrete elements.	PSC
Cracking (PSC) 1110	This defect is used to report cracking in prestressed concrete element.	PSC
Efflorescence / Rust Staining 1120	This defect is used to report efflorescence / rust staining in concrete and masonry elements.	PSC, RC, Masonry, and Other
Cracking (RC and Other) 1130	This defect is used to report cracking in reinforced concrete and other material elements.	RC and Other
Decay / Section Loss 1140	This defect is used to report decay (section loss) in timber elements.	Timber
Check / Shake 1150	This defect is used to report checks and shakes in timber elements.	Timber
Crack (Timber) 1160	This defect is used to report cracking in timber elements.	Timber
Split / Delamination (Timber) 1170	This defect is used to report splits / delamination in timber elements.	Timber
Abrasion / Wear (Timber) 1180	This defect is used to report abrasion in timber elements.	Timber
Abrasion / Wear (PSC/RC) 1190	This defect is used to report abrasion / wear in PSC and RC elements.	PSC and RC
Deterioration (Other) 1220	This defect is used to report general deterioration in elements constructed of other materials such as fiber reinforced plastics or similar.	Other

Defect	Definition	Materials
Mortar Breakdown (Masonry) 1610	This defect is used to report breakdown of masonry mortar between brick, block, or stone.	Masonry
Split / Spall (Masonry) 1620	This defect is used to report splits or spalls in brick, block, or stone.	Masonry
Patched Area (Masonry) 1630	This defect is used to report masonry patched areas.	Masonry
Masonry Displacement 1640	This defect is used to report displaced brick, block, or stone.	Masonry
Distortion 1900	This defect is used to report distortion from the original line or grade of the element. It is used to capture all distortion regardless of cause.	Steel, PSC, RC, Masonry, Timber, and Other
Movement 2210	This defect is used to report movement of bridge bearing elements.	Other
Alignment 2220	This defect is used to report alignment of bridge bearing elements.	Other
Bulging, Splitting or Tearing 2230	This defect is used to report bulging, splitting or tearing of elastomeric bearing elements.	Other
Loss of Bearing Area 2240	This defect is used to report the loss of bearing area for bridge bearing elements.	Other
Leakage 2310	This defect is used to report leakage through or around sealed bridge joints.	Other
Seal Adhesion 2320	This defect is used to report loss of adhesion in sealed bridge joints.	Other
Seal Damage 2330	This defect is used to report damage to the rubber in bridge joint seals.	Other
Seal Cracking 2340	This defect is used to report cracking in the rubber in bridge joint seals.	Other
Debris Impaction 2350	This defect is used to report the accumulation of debris in bridge joint seals that may or may not affect the performance of the joints.	Other
Adjacent Deck or Header 2360	This defect is used to report concrete deck damage in the area anchoring the bridge joint.	Other
Metal Deterioration or Damage 2370	This defect is used to report metal damage or deterioration in the bridge joint.	Other
Delamination / Spall / Patched Area / Pothole (Wearing Surfaces) 3210	This defect is used to report spalls, delaminations, patched areas and potholes in wearing surface elements.	Wearing Surfaces
Crack (Wearing Surface) 3220	This defect is used to report cracking in wearing surface elements.	Wearing Surfaces
Effectiveness (Wearing Surface) 3230	This defect is used to report the loss of effectiveness in the protection provided to the deck by the wearing surface elements.	Wearing Surfaces
Chalking (Steel Protective Coatings) 3410	This defect is used to report chalking in metal protective coatings.	Steel Protective Coatings

Defect	Definition	Materials
Peeling / Bubbling / Cracking (Steel Protective Coatings) 3420	This defect is used to report peeling, bubbling or cracking in metal protective coatings.	Steel Protective Coatings
Oxide Film Degradation Color / Texture Adherence (Steel Protective Coatings) 3430	This defect is used to report oxide film degradation of texture in metal protective coatings.	Steel Protective Coatings
Effectiveness (Steel Protective Coatings) 3440	This defect is used to report the loss of effectiveness of metal protective coatings.	Steel Protective Coatings
Wear (Concrete Protective Coatings) 3510	This defect is used to report the wearing of concrete protective coatings.	Concrete Protective Coatings
Chalking (Concrete Protective Coatings) 3520	This defect is used to report chalking of concrete protective coatings.	Concrete Protective Coatings
Peeling / Bubbling / Cracking (Concrete Protective Coatings) 3530	This defect is used to report peeling / bubbling / cracking of concrete protective coatings.	Concrete Protective Coatings
Effectiveness (Concrete Protective Coatings) 3540	This defect is used to report the effectiveness of concrete protective coatings.	Concrete Protective Coatings
Effectiveness – Protective System (e.g. cathodic) 3600	This defect is used to report the effectiveness of internal concrete protective systems (epoxy rebar, cathodic protection, etc.)	Concrete Reinforcing Steel Protective System
Settlement 4000	This defect is used to report settlement in substructure elements.	Steel, PSC, RC, Masonry, Timber, and Other
Scour 6000	This defect is used to report scour in substructure elements.	Steel, PSC, RC, Masonry, Timber and Other
Damage 7000	This defect is used to capture impact damage that has occurred.	All

Environmental Factors (Service Conditions)

Elements exposed to different environmental factors and service conditions deteriorate differently. These factors may include:

- Operational activities from traffic volumes and truck movements
- Exposure to water, road salt, and other corrosive materials
- Condition of protective and water proofing systems
- Temperature extremes, either from nature or human activity

When inventorying and assessing the condition of the elements, an inspector should consider the environment in which the element is operating. The environment designation of an element can change over time; as it would, for example, if operating policies were changed to reduce the use of road salt. However, by definition, the environment designation for any element cannot change as the result of maintenance work or deterioration.

Environment	Description
1-- Benign	Neither environmental factors nor operating practices are likely to significantly change the condition of the element over time, or their effects have been mitigated by the presence of highly effective protective systems.
2-- Low	Environmental factors, operating practices, or both either do not adversely influence the condition of the element or their effects are substantially lessened by the application of effective protective systems.
3-- Moderate	Any change in the condition of the element is likely to be quite normal as measured against the environmental factors, operating practices, or both that are considered typical by the agency.
4-- Severe	Environmental factors, operating practices, or both, contribute to the rapid decline in the condition of the element. Protective systems are not in place or are ineffective.

Examples of factors that could increase the severity of the environment rating for various types of elements may include any of the following. The inspector would record the predominant environment factor affecting an element.

Element	Example Environmental Factors
Timber Elements	High Moisture Content Pest Infestation Ice flow impacts
Steel Elements	Distance from salt air Water wet/dry cycles Exposure to corrosive soils and liquids
Concrete Elements	Freeze thaw cycles Tire Chain wear Deck salting
Petroleum Based	High Temperatures
Joints and Bearings	Extreme Temperature Ranges
Operating Practices	High Traffic and or Truck volume

Appendix I – Load Rating

References

All load ratings shall be in accordance with the latest edition of the *AASHTO Manual for Bridge Evaluation*.

Structure Model

All structures that meet the NBI definition of a bridge shall be load rated using the latest version of AASHTOWare Bridge Rating unless the structure type is not supported by the software.

The load rater shall provide a rating manual for any bridge type that is not compatible with AASHTOWare Bridge Rating. The rating manual shall consist of an ALDOT approved software to load rate the bridge for future permit vehicles. Such oversize permit vehicles may have up to 30 axles at varying axle spaces and 2 to 8 tires per axle with varying tire spaces. Each bridge load rating submission shall include the computer files in electronic format.

The HS-20 (LFD) or HL-93 (LRFD) design vehicle shall be evaluated at both the Inventory and Operating Level.

The entire suite of ALDOT posting vehicles and the FAST Act's Emergency Vehicles (EV2 and EV3) shall all be analyzed at the Operating Level. Reference Figure I-1 for the ALDOT posting vehicles.

All assumptions used during the load rating process shall be documented and accompanied with the final load rating results. The Structure Rating Summary Sheet (Figure I-2) and Structure Rating Result Sheet (Figure I-3) shall be filled out in its entirety. The Structure Rating Result Sheet shall be stamped and signed by a Professional Engineer.

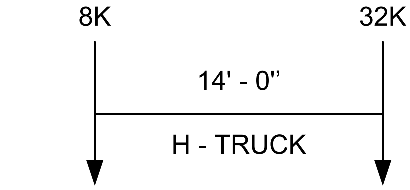
The structure model and analysis results shall be submitted to the Bridge Rating and Load Testing office.

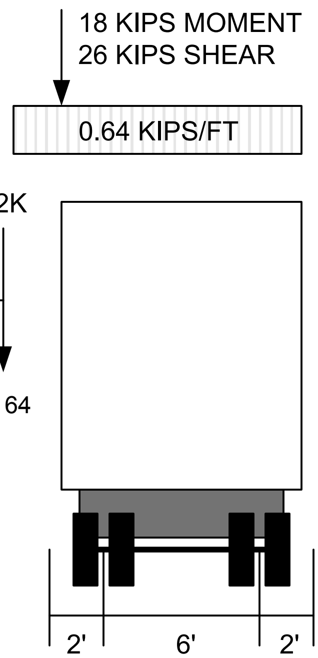
Specifications

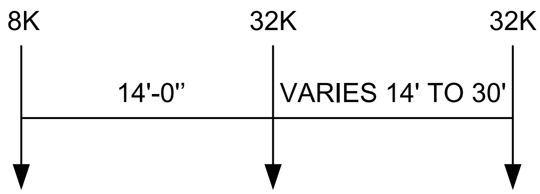
Structures designed LFD or ASD shall be load rated per the LFR Specifications.

Structures designed LRFD shall be load rated per the LRFR Specifications.

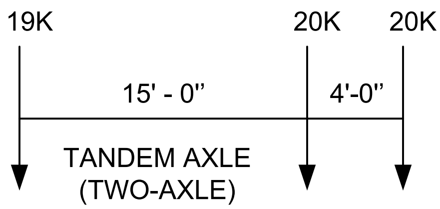
ALABAMA DEPARTMENT OF TRANSPORTATION POSTING VEHICLES

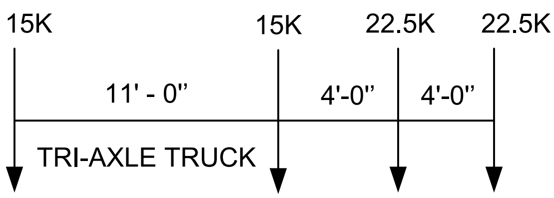


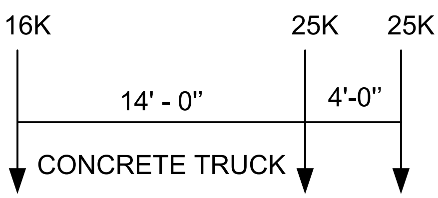




HS TRUCK – USED FOR REPORTING ITEMS 64 & 66 OF THE BI-6 TO THE FHWA

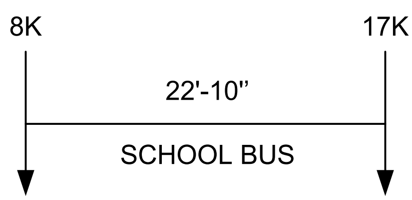


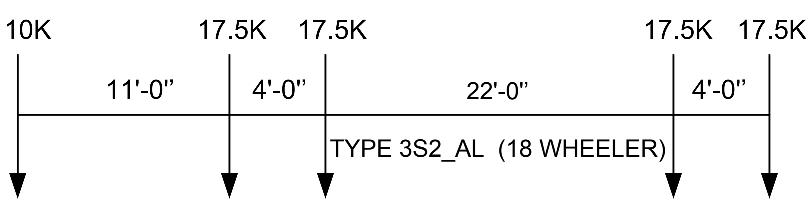




VEHICLE TYPE		POSTING (TONS)
H DESIGN	20T	
TWO-AXLE	29.5T	
TRI-AXLE	37.5T	
CONCRETE	33T	
18 WHEELER (3S2)	40T	
6 AXLE (3S3)	42T	
SCHOOL BUS	12.5T	

POSTING IS NOT REQUIRED IF THE TONNAGE IS NOT SHOWN





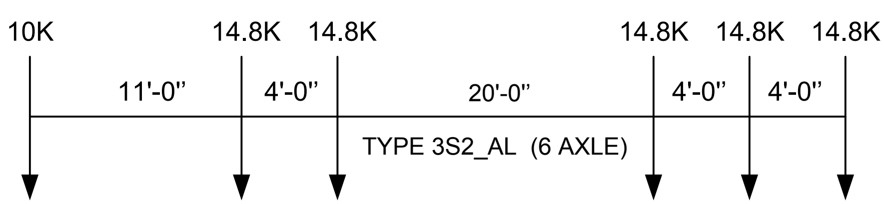


Figure I-1: ALDOT Posting Vehicles

STRUCTURE RATING SUMMARY SHEET

ALABAMA DEPARTMENT OF TRANSPORTATION
MAINTENANCE BUREAU: BRIDGE RATING SECTION

BIN: 0 1 0 7 3 3

STR NUM: O - C O 0 0 0 1 - 3 4 - 0 0 0 0 M 0 0 2 - 0 0

AREA: Troy   DATE: July 26, 2017   BY: Daniel D. Jones

COUNTY: Henry   CITY: -------------------------------   OWNER (ITEM 22)……. 1

METHOD OR TOOLS USED FOR RATING:
☐ BARS (☐MF ☐C) (v ________ m ________) ☐Hand Calculations
☑ VIRTIS (v 6.8.1) ☐BRASS (v ________) ☐BRUFEM (v ________)
☐ Other

SPECIFICATION: ☐ ASD ☑ LFD ☐ LRFD ☐ LOAD TEST ☐ Other

CURRENT POSTING STATUS: ITEM 41 = A   ITEM 70 = 5

GENERAL DESCRIPTION AND HISTORY OF STRUCTURE

DRAWING INFORMATION

ORIG. PROJ. # BRZ - 1726

WIDENING OR RECONST. PROJ. #

WIDENING OR RECONST. PROJ. #

SPAN #	MAIN SPAN STD DRAWING #
1	SPECIAL

SPAN #	APPROACH SPAN STD DWG #

SPECIAL RATING NOTES/CONDITIONS/ASSUMPTIONS

BrM Rating Event Input

ITEM 63 -	1 LF Load Factor
ITEM 65 -	1 LF Load Factor
ITEM 249 -	A LFD
ITEM 250A -	F AASHTO BrR (Virtis)
ITEM 250B -	N Not Rated / Analyzed
ITEM 251 -	1 ALDOT (Maint. Bureau)
ITEM 252 -	7/26/2017
ITEM 41 -	**ITEM 70 - 5**
ITEM 253A -	Y Rating Published
ITEM 253B -	N No Action
ITEM 253C -	N No Action
ITEM 257A -	B Superstructure
ITEM 257B -	0 None / Condition Noted
ITEM 259 -	A Include on Posting Chart
ITEM 265 -	SPECIAL
ITEM 266 -	NNNNNNN

NOTES TO INSPECTOR

ITEM	103	58	59	60	61	62
CODE		5	5	6	5	N

STRUCTURE RATING RESULTS

VEHICLE	Tons	ALLOWABLE WEIGHT (TONS)	LEGAL Y	LEGAL N
HS (OPERATING) ITEM 64	36	56.7	X	
HS (INVENTORY) ITEM 66	36	34.0		X
H - TRUCK ITEM 254 A	20	34.1	X	
2 - AXLE TRUCK ITEM 254 B	29.5	48.1	X	
TRIAXLE DUMP TRK ITEM 254 C	37.5	43.3	X	
CONCRETE TRK ITEM 254 D	33	43.1	X	
18-WHEELER (3S2 AL) ITEM 254 E	40	73.3	X	
6 - AXLE (3S2 AL) ITEM 254 F	42	66.7	X	
SCHOOL BUS ITEM 254 G	12.5	40.1	X	

REVISION DATE: 7/26/2016

Figure I-2: Structure Rating Summary Sheet

STRUCTURE RATING RESULT SHEET

Alabama Department of Transportation
Maintenance Bureau

ATTENTION: Troy Area Bridge Inspector
FORWARD: ------------------------------

STR: O - C O 0 0 0 1 - 3 4 - 0 0 0 0 M 0 0 2 - 0 0

BIN: 0 1 0 7 3 3

AREA:	COUNTY:	CITY:
Troy	Henry	------------------------------

SIGN ORDERING INFORMATION

ITEM	SIZE	COMMODITY NO.	QTY
6 VEHICLE TONNAGE SIGNS (R12-5A)	☐ 30 X 54	10001-0000383	
	☐ 24 X 48	10001-0000411	
SCHOOL BUS PLAQUE	☐ 30 X 10	10001-0000417	
	☐ 24 X 10	10001-0000416	
WARNING SIGNS (W38-1A) "WT RESTRICTED BRIDGE AHEAD"	☐ 36 X 36	10002-0000296	
WARNING PLAQUE (W38-1B) "xx MILES"	24 X 18	10002-0000297	
	MILES:		
	MILES:		
	MILES:		

VEHICLE TYPE / POSTING

VEHICLE TYPE		POSTING TONS (U.S.CUST.)
H DESIGN	20T	-----
TWO-AXLE	29.5T	-----
TRI-AXLE	37.5T	-----
CONCRETE	33T	-----
18 WHEELER (3S2)	40T	-----
6 AXLE (3S3)	42T	-----
SCHOOL BUS	12.5T	-----

POSTING IS NOT REQUIRED IF THE TONNAGE IS NOT SHOWN

BrM UPDATE

CHANGE ITEM 41 TO	CHANGE ITEM 70 TO
A	**5**

RATING RESULTS

OPERATING RATING (ITEM 64) (U.S. Cust. Tons)	**56.7**
INVENTORY RATING (ITEM 66) (U.S. Cust. Tons)	**34.0**

REASON FOR POSTING

ITEM 257 A

- ☐ A. DECK
- ☐ B. SUPERSTRUCTURE
- ☐ C. SUBSTRUCTURE
- ☐ D. DECK + SUPER
- ☐ E. DECK + SUB
- ☐ F. SUPER + SUB
- ☐ G. DECK + SUPER + SUB
- ☐ H. CULVERT

ITEM 257 B

- ☐ 1. UNDER DESIGNED (L =)
- ☐ 2. DETERIORATION
- ☐ 3. IMPACT DAMAGE
- ☐ 4. FLOOD/SCOUR DAMAGE
- ☐ 5. FIRE DAMAGE
- ☐ 9. OTHER

ITEM 58 = 5 ITEM 59 = 5 ITEM 60 = 6 Item 62 = N

APPLICABLE NOTES:

SEE REVERSE SIDE OF THIS FORM

1 ☒ 2 ☐ 3 ☐ 4 ☐

RATER's COMMENTS

0

RATING METHOD

- ☑ LOAD FACTOR
- ☐ ALLOWABLE STRESS
- ☐ LOAD and RESIST FACTOR
- ☐ LOAD TEST
- ☐ VISUAL INSPECTION

(Manual for Bridge Eval 2011. Sec. 6.1.4)

- ☐ OTHER

DRAWING INFO

Proj #'s BRZ - 1726
0

Std Drwg #'s SPECIAL
0
0

Daniel D. Jones	07/26/17
Rating Engineer	Date

Figure I-3: Structure Rating Result Sheet

GENERAL NOTES

Please refer to the "Applicable Notes" block on the front of this form to see which of these General Notes apply to this structure rating. Notes that are **not** referenced do not apply.

Note Number	Note
1	No posting is required for this structure. This form is for your files. Code Item 258A as "N".
2	Remove all posting and warning signs associated with this structure. After signs are removed, code Item 258A as "R" and code the appropriate date in Item 258B.
3	Erect new posting signs at the structure with the vehicle weights shown on the front of this form. Erect warning signs as needed. After signs are in place, code Item 258A as "E" and code the appropriate date in Item 258B.
4	Change the existing posting and warning signs associated with this structure to reflect the new posting limits shown on the front of this form. After signs have been changed, code Item 258A as "C" and code the appropriate date in Item 258B.

Important!

Once posting signs have been erected / changed please send pictures to the Bridge Rating and Load Testing office by one of three methods:

1. Mail -
   Alabama Department of Transportation
   Maintenance Bureau - Bridge Rating and Load Testing
   Montgomery, AL 36110

2. Fax - (334) 242-6851

3. E-mail - jonesdan@dot.state.al.us

Thank you for your cooperation. If you have any questions, please call the Bridge Rating and Load Testing office at (334) 242-6500.

Appendix J – State Structures Underwater Inspection Frequency Exception

The structures listed below have an ALDOT approved exception to the two-year underwater inspection cycle requirement.

		Feature	Underwater Inspection Frequency (Years)	
BIN	**Route**	**Intersected**	**Main Channels**	**Entire Structure**
11930	I-10 WB	Mobile Bay	2	4
11931	I-10 EB	Mobile Bay	2	4
12321	I-65 SB	Mobile River Delta	2	4
12322	I-65 NB	Mobile River Delta	2	4