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## 1 SCOPE

The Arizona Department of Transportation (ADOT) Bridge Inspection Guidelines are intended to describe bridge inspection procedures that must be followed in Arizona, and to provide uniform interpretation of the various nationally available inspection and coding guides. These guidelines provide for consistency of bridge inspection throughout the state. Any deviation of these guidelines requires approval of the ADOT Bridge Group.

The National Bridge Inspection Standards (NBIS) are published in the Code of Federal Regulations, 23 CFR 650, Subpart C. The NBIS set the national standard for the proper safety inspection and evaluation of bridges and apply to all structures defined as highway bridges located on all public roads. ADOT Bridge Inspection Guidelines detail Arizona's policies and procedures for the condition inspection of bridges.

These guidelines attempt to cover the majority of issues that may be encountered while performing and documenting a bridge inspection in Arizona; however, they are not intended to be exhaustive nor are they intended to replace bridge inspection textbooks and manuals. Adhering to these guidelines does not relieve bridge inspection personnel from the responsibility of applying sound engineering principles throughout the bridge inspection process. In the event of conflicting information or requirements between these Guidelines and the NBIS, the NBIS will govern. If a conflict is discovered, please notify ADOT Bridge Inspection Program Manager immediately.

The following are some useful references to be consulted by bridge inspection personnel:

- National Bridge Inspection Standards (NBIS), Code of Federal Regulations, Title 23, Part 650, Subpart C
- Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (FHWA)
- Bridge Inspector's Reference Manual (FHWA)
- Inspection of Fracture Critical Bridge Members (FHWA)
- Culvert Inspection Manual (FHWA)
- Manual on Uniform Traffic Control Devices (FHWA)
- AASHTO LRFD Bridge Design Specifications
- AASHTO Manual for Bridge Evaluation
- ADOT Safety Policies

## 2 BRIDGE INSPECTION RESPONSIBILITIES

ADOT's Bridge Management Section (BMS), which is an organizational unit within the Bridge Group, is responsible for the bridge inspection program in Arizona. It employs in-house and consultant bridge inspection teams to perform safety bridge inspections on most of Arizona's publicly owned bridges. These include all of the bridges on the state highway system and the majority of the bridges that are owned or operated by Arizona local governments.

Some local government agencies perform their own bridge inspections. In order for a bridge owning local government agency to conduct its own bridge inspections, whether through in-house or consultant inspectors, it must demonstrate that it complies with the NBIS. Also, it must submit written documentation to ADOT's Bridge Inspection Program Manager, detailing its bridge inspection program, quality assurance, and quality control procedures. The documentation will be reviewed by ADOT and the Federal Highway Administration (FHWA) for compliance with national and state requirements prior to granting the approval. After the initial submission and approval of this documentation, it shall be updated by local government agencies as needed and it will be reviewed at least once every five years by ADOT and the FHWA. If ADOT and the FHWA determine that a local government agency is not in compliance of the NBIS and the state requirements, the bridge inspection program may be taken over by the state.

Local government agencies that perform their own bridge inspections shall submit quarterly progress reports and annual electronic National Bridge Inventory records complying with FHWA reporting guidelines to the ADOT Bridge Inspection Program Manager. A sample quarterly progress report is included in Appendix B.

### **3 BRIDGE INSPECTION PROCEDURES**

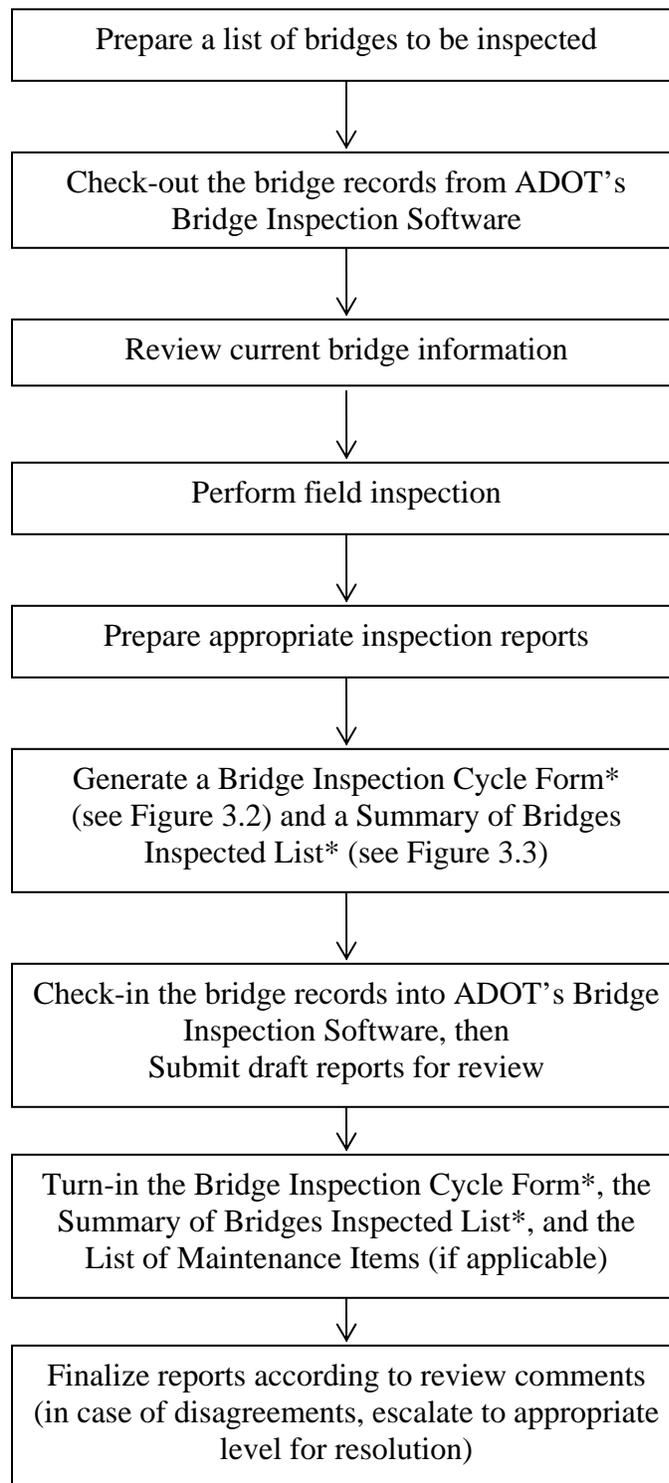
#### **3.1 General**

All bridge inspections shall be performed in accordance with these guidelines and shall comply with the NBIS. Figure 3.1 displays a flowchart that details the bridge inspection process. The submittal package should include the following items in the order shown below:

- Bridge Inspection Cycle Form (Figure 3.2)
- Summary of Bridges Inspected List (Figure 3.3)
- Structure Inventory and Appraisal (SI&A) Report
- Repair Report (if applicable)
- List of Maintenance Items (if applicable)
- Inspection Report
- Vertical and Horizontal Clearance Diagram (if applicable)
- Channel Profile Diagram (if applicable)
- Sketches (if applicable)
- Inspection Photographs
- Camera Location Diagram (if applicable)

Special inspections, such as collision or flood damage assessments, which do not require a complete bridge inspection, shall be documented as such and the inspection number should not be incremented as not to affect the annual NBI data submittal or the next scheduled inspection. Draft special inspections' reports and notes to file must be forwarded to the Bridge Inspection Program Manager for review.

Figure 3.1 – ADOT Bridge Inspection Flowchart



\* Cycle Forms and Summary of Bridges Inspected Lists shall always be prepared by ADOT staff

Figure 3.2 – Bridge Inspection Cycle Form

<b>BRIDGE INSPECTION CYCLE</b>			
TEAM: <input style="width: 40px;" type="text"/>	MAINT ORG: <input style="width: 40px;" type="text"/>	PACKET NUMBER: <input style="width: 40px;" type="text"/>	
ROUTE NUMBER: <input style="width: 40px;" type="text"/>		NO. OF FILES IN PACKET: <input style="width: 40px;" type="text"/>	
Begin MP <input style="width: 40px;" type="text"/>	End MP: <input style="width: 40px;" type="text"/>	AGENCY NAME: <input style="width: 100%; border: none;" type="text"/>	
Check here if this is a partial local agency packet: <input type="checkbox"/> Check here if location map included: <input type="checkbox"/>			
<b>PHASE I</b>			
1. FILE CHECK OUT DATE: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
<b>PHASE II</b>			
2. FIELD INSPECTION DONE: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
3. FILE ASSEMBLY, PHOTOS DONE: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
4. FORWARD PACKET FOR REVIEW: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
<b>PHASE III</b>			
5. REVIEW COMPLETION DATE: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
6. RETURN TO TEAM FOR CORRECTIONS: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
7. TEAM REVISIONS COMPLETION DATE: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
<b>PHASE IV</b>			
8. RETURN FILES TO FILE SYSTEM: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
9. PREPARE TRANSMITTALS: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
10. TRANSMIT REPORTS TO CUSTOMER: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
<b>PHASE V</b>			
11. ADD TO BG-IDMS: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
12. REVIEW OF BG-IDMS DOCUMENTS ADDED: <input style="width: 40px;" type="text"/>	BY: <input style="width: 40px;" type="text"/>		
<b>REMARKS:</b>			

- Notes:
1. Cycle Forms and Summary of Bridges Inspected Lists should list the same bridges.
  2. Each Cycle Form should contain bridges owned by only one Agency. For State Bridges, Cycle Forms should be generated by Single Maintenance Organization Number and bridges should be listed in Remarks Section by ascending Milepost order. Local Agency bridges will be listed in Remarks Section in sequential order of bridge number. Cycle Forms will be created by in-house teams having responsibility over the region where the bridges are located. Generally, no more than 15 bridges should be listed on one Cycle Form (this also applies to Summary of Bridges Inspected List).



### 3.2 Bridge Inspection Planning

- Inspection personnel should contact ADOT District maintenance organizations or appropriate local government personnel prior to inspecting bridges that are located within the jurisdiction of these entities. Maintenance or local government personnel should be encouraged to accompany the bridge inspection team during the field inspections. They could provide valuable information about on-going maintenance issues, flooding history, previous repair projects, and planned future projects. Also, in the case of local government agencies, they may identify structures that need to be added to the NBI.
- When planning bridge inspections, websites that display information on traffic restrictions caused by construction must be consulted. Inspection personnel must coordinate bridge inspection activities in construction zones with resident engineers.
- When required, traffic control plans for bridge inspections should be prepared in consultation with ADOT District or local agency personnel. They must be submitted at least two weeks prior to the inspection and must be approved by the District or the local government agency that have jurisdiction over the bridge. The approved Traffic Control plans should be sent to BMS for recordkeeping.
- Bridge inspectors should gather any missing bridge documentation such as as-built drawings for existing and new structures and determine if any structure was rehabilitated or replaced and include project plans in the bridge file. The plan information on the inside cover of the inspection folder should be updated accordingly.
- Prior to inspecting bridges which carry or cross over railroad tracks, a permit may need to be obtained from the railroad company. In certain instances, ADOT has obtained a systemic permit from railroad companies to inspect those bridges. Bridge inspectors should check the availability of such permits. In general, when the bridge carries the railroad tracks, the railroad company would be the bridge owner (NBI item N22 = 27) and the state or the local agency will be responsible for its maintenance (NBI item N21 should be coded according to the road ownership). When the bridge spans over the railroad tracks, both ownership and maintenance responsibility belong to the state or the local agency and NBI items N21 and N22 should be coded accordingly.
- Inspection personnel should strive to schedule inspections of canal bridges during dry out periods.
- Jointly owned border bridges with California, City of Needles, and Nevada are inspected by Caltrans or NDOT under the terms of Intergovernmental Agreements between Arizona and these other entities. Inspection reports and data must be obtained and documented in Arizona's bridge inventory.
- Structure numbers are assigned by the Bridge Inspection Program Manager to all NBI structures based on ownership. Whenever a structure ownership transfers from the state to a local government or vice versa, a new structure number must be assigned and the old number is retired. Transfer of structures' ownership between local governments will not necessitate an assignment of a new structure number.
- Initial bridge inspections should be performed prior to opening the roadway to traffic. This would facilitate the condition assessment of all bridge elements and would enable accurate measurements of vertical and horizontal clearances under safe conditions.

- It is imperative that bridge inspection personnel, whether ADOT or consultant staff, comply with all of ADOT's safety policies at all times including wearing hard hats, steel toed boots and safety vests.

### 3.3 Field Inspection

Currently, ADOT requires that both the NBI condition rating and the element level rating be evaluated. It is the responsibility of the inspection personnel to ensure that values assigned through these two methods are not in conflict. For example, a deck condition rating of 4 (NBI Item N58) should not be utilized with a deck element condition state of 1.

During field inspection, team members should adhere to the following:

- Remain within the limits of the right of way.
- When specifying traffic directions on the state highway system, the highway's cardinal direction should always be used instead of the compass direction. Compass directions should be used when specifying all other directions and when inspecting local agency bridges.
- In the event of the discovery of a new structure that qualifies for the NBI, inspection personnel should perform an initial inspection of that structure while in the field. Afterwards, the BMS office technician should be informed of the existence of the unaccounted for structure. A new structure number will be assigned and a skeleton record will be created in the database. At that point, the inspection team shall update the database with the information gathered in the field and create all necessary inspection documents.
- When inspecting a structure with missing as-built plans, inspection personnel should prepare elevation, plan, and cross-section details in addition to obtaining all required information for conducting a load rating analysis.
- The inspector must alert the Bridge Inspection Program Manager whenever a bridge element has deteriorated or has been damaged to an extent where a new load rating must be performed. A review of the Load Rating Report could provide valuable information about critical bridge elements and locations. An increase in overlay thickness could also justify a new load rating.
- In the event that a scour plan of action (POA) does not reflect current conditions, the inspector must alert the Bridge Inspection Program Manager.

### 3.4 Bridge Inspection Documents

Bridge inspection documents must be written using appropriate technical terminology. They should not contain abbreviated text. Inspectors' personal notebooks may contain those; however, inspectors should refrain from using any abbreviation in all formal documents that are associated with the bridge inspection. Common acronyms may be used.

The following bridge inspection documents are normally produced as a result of an inspection:

- Structure Inventory and Appraisal (SI&A) Report

- Repair Report (if applicable)
- List of Maintenance Items (if applicable)
- Inspection Report
- Vertical and Horizontal Clearance Diagram (if applicable)
- Channel Profile Diagram (if applicable)
- Sketches (if applicable)
- Inspection Photographs
- Camera Location Diagram (if applicable)

A description of each of the above documents follows. In addition, a sample of each of these documents is included in Appendix A.

### 3.4.1 Structure Inventory and Appraisal (SI&A) Report

The SI&A document is a collection of bridge data that include a large portion of the fields which constitute the NBI. ADOT customized this NBIS required report by grouping like data together and adding Arizona specific items to it.

#### 3.4.1.1 General

- When a dropdown list is provided within the inspection software, the user shall select the appropriate entry from the list. In the event that the list is missing an appropriate entry, the user shall notify the database administrator so that the list would be updated accordingly.
- NBI items N13a and N13b, LRS Inventory Route and Sub-route, are globally populated by the database administrator.
- When coding NBI item N28a, Lanes on, count and record lanes which carry actual traffic only. A temporarily closed lane, i.e., for construction purposes, shall be counted. Lanes that are not in use, including median lanes, shall not be counted.
- The inspection quarter field, Arizona item A207, shall not be altered! Next inspection due date, Arizona item A228, should be equal to current inspection date, NBI item N90, plus the inspection frequency, NBI item N91. However, if the calculated date would result in a future inspection date beyond the assigned inspection quarter, then the last day of the assigned quarter should be used for A228.
- Arizona item A235 must only be set to “Active” after the initial inspection has been reviewed and finalized.
- During the initial inspection of a structure that was replaced, Arizona item A300 must contain a reference to the number of the retired (replaced) structure. Also, prior to designating the replaced structure as “Retired” under Arizona item A235, item A300 must contain a reference to the new structure number. Note that once a structure is designated as “Retired”, A235 = R, the inspection software will prevent the user from making any updates to the database. Therefore, all updates and cross-references must be performed prior to setting A235 = R.

### 3.4.1.2 Data to Be Updated by Bridge Management Section Office Staff Only

The following items, which are listed under the same headings that appear in the SI&A Report, should not be modified by inspection personnel without prior approval from the Bridge Inspection Program Manager:

- Location Information
  - NBI item N4, Place Code.
- Inventory Route Data
  - NBI item N26, Functional Route Classification.
- Responsibility
  - NBI item A203, ADOT Maintenance Org. Number.
- Load, Rate, and Post
  - NBI item N63, Method Used for Operating Rating.
  - NBI item N64, Operating Load Rating.
  - NBI item N65, Method Used for Inventory Rating.
  - NBI item N66, Inventory Load Rating.
  - NBI item N70, Bridge Posting (should be consistent with N41, Structure Open, Posted, or Closed Traffic).
  - Arizona item A222, Date of Load Rating.
- Construction Project Data
  - Arizona item A225, Deck Area.
- Inspection
  - Arizona item A207, Inspection Quarter.
- Critical Features
  - NBI item N92A, Fracture Critical.
  - NBI item N92B, Underwater Inspection.
  - NBI item N92C, Special Inspection.
  - Arizona item A234, Steel In-Depth Inspection Frequency.

### 3.4.1.3 Common Data Entry Errors

- NBI item N5d, Inventory Route Number, is a 5-digit long numerical field and should start with leading zeros as needed. For example, use “00008” for I-8, “00010” for I-10, “00089” for 89A, “00101” for Loop 101, etc...
- NBI item N5e, Directional Suffix, shall not be left blank for any vehicular bridge.
- NBI item N16, Latitude, is 5-digit long and does not contain decimal points, for example, use “35273” for 35 degrees 27.3 minutes.
- NBI item N17, Longitude, is 6-digit long and does not contain decimal points, for example, use “114436” for 114 degrees 43.6 minutes.
- When a previously recommended weight limit sign is missing, NBI item N41, Structure Open, Posted, or Closed Traffic, shall be coded as “B”. A new repair recommendation to replace the missing sign should be created.
- NBI item N49, Structure Length, should be 20 ft or greater when NBI item N112, NBIS Bridge Length, is coded “Y”.

- Proposed Improvements items, NBI items N75, N76, N94, N95, N96 and N97, must be coded for any structure with a Sufficiency Rating of 80 or less; NBI item N97 shall indicate a date within 8 years from the current inspection year. Otherwise, the user must update this item.
- The year portion of NBI items N92 and N93, Critical Feature Inspection, must be coded as 4-digit (YYYY).

### 3.4.2 Repair Report / List of Maintenance Items

Repair recommendations should only be issued for valid and practical items that need to be repaired. Inspection personnel should keep in mind that they are performing safety inspections of bridges and that repair recommendations that qualify under this criterion should be issued.

Other observed maintenance related items should be noted in the various inspection notes' fields provided throughout the inspection report sections. Therefore, a repair recommendation to patch a spall that does not affect the structural integrity of a given bridge element should not be made. Likewise, a repair recommendation dealing with aesthetic treatment should not be made. Both of these examples should be noted as observations in the appropriate inspection notes' sections of the inspection report.

A repair recommendation should not be created for the following maintenance items:

- Protruding joint angles\*
- Drainage grates, manhole and junction box covers\*
- Tree branches, vegetation, or other obstruction protruding over bridge decks\*
- Exposed wires, cables, etc...\*
- Approach slab settlements
- Potholes in roadway approach or on bridge decks
- Joints between approach roadway and approach slabs
- Missing joint seals
- Damage to chain link and pedestrian fences
- Minor concrete spalls on bridge elements
- Damage to roadway drainage appurtenances
- Clogged drains
- Damage to roadway approach guardrail and end treatment
- Minor damage to bridge railings
- Cleaning debris around bearings
- Lighting fixtures, utility lines or casings
- Bird netting damage
- Cleaning of channel debris, vegetation growth, sediments, etc...
- Cleaning debris and sedimentation from culverts
- Graffiti removal

\* This item may require immediate maintenance personnel notification depending on field conditions

- Weed removal
- Irrigation system repair
- Minor erosion
- Minor damage to bank protection elements such as rail-banks, gabions, etc...

Maintenance items such as the ones listed above should be summarized in the List of Maintenance Items form, see Figure 3.5. An example of this form is included in Appendix A. This list provides maintenance personnel with a summary of the maintenance items so that a thorough reading of the inspection report is not required. These maintenance items shall be also listed under the Other Miscellaneous Inspection Notes subsection of the Inspection Report (refer to 3.4.3.3.8 of these Guidelines).

The inspector should consult with the Bridge Inspection Program Manager prior to issuing a repair recommendation with a Repair Task Priority of 1 or 2 (See Figure 3.4 for the descriptions of Repair Task Priorities). In the event that the bridge must be closed, the inspector should contact first the appropriate District or Local Agency depending on structure ownership. Then the Bridge Inspection Program Manager should be informed.

When NBI item N58, Deck Condition Rating, is 4 or less, a repair recommendation stating that “Bridge Group will initiate a bridge deck rehabilitation project on a priority basis” should be created.

Previously issued repair recommendations that were not implemented and are in accordance with these guidelines should be repeated. The inspector should not refer back to previous recommendations; instead new repair recommendations corresponding to the current inspection must be created.

Figure 3.4 – Repair Task Priority Descriptions

Repair Task Priority	Description
1	Immediate action required
2	Repair work to take priority over routine work
3	Repair work that can be scheduled
4	No repairs – may require special attention (inspector will describe)
5	No action is required (inspector may specify monitoring requirements)

Figure 3.5 – List of Maintenance Items

**Arizona Department of Transportation  
Bridge Group  
List of Maintenance Items**

Str. No.	Structure Name	Rt.	MP	Description of Maintenance Items

<b>District:</b>		<b>Org. Number:</b>	
------------------	--	---------------------	--

<b>Inspected by:</b>	<b>Date:</b>
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### 3.4.3 Inspection Report

The bridge inspection report documents all of the observations that are made during the field inspection. Bridge inspection reports must be sealed and signed by a professional engineer licensed in civil or structural engineering by the Arizona Board of Technical Registration. Corrections should be implemented prior to sealing and signing reports. Inspection personnel should strive to maintain objectivity and factual reporting of field observations. Subjective reporting and editorializing of comments are not acceptable.

#### 3.4.3.1 General

- Inspection notes should be provided for all bridge components. This includes situations where components are in good condition. For example and if appropriate, the inspector should remark that “overall superstructure is in good condition”.
- Element and sub-element descriptions should be always provided and not left blank. In some instances, consulting the as-built plans may be helpful. Comments or observations should be documented within the Notes sections and not within these descriptions.
- Condition ratings shall be assigned based on the overall condition of the bridge element and not on a localized area. Any one point increase or decrease in condition ratings should be documented as inspection notes. Element condition states must be updated accordingly to maintain consistency between the two rating methods.
- Inspection personnel should consult with the Bridge Inspection Program Manager whenever a condition rating is being modified by two points or more.
- The Bridge Inspection Program Manager must be notified in instances where an overall condition rating is 4 or less.
- When bridge elements are not visible, inspectors should maintain previously documented condition ratings unless actions were taken to improve the condition of the element since the last inspection. Those actions must be documented in the inspection report and bridge file. A note clarifying that the element is not visible or accessible should also be added. A common example is when a bridge deck is overlaid since the last inspection.
- Condition ratings of 9 should only be used when describing excellent element conditions for newly built structures.
- Appropriate justification is needed in the event that:
  - The sufficiency rating significantly changes;
  - The structure is no longer classified as structurally deficient or functionally obsolete; or
  - The structure gains a structurally deficient or functionally obsolete classification.
- Piers and spans should be numbered sequentially in the direction of increasing stations. Note that the first substructure element is referred to as abutment number 1; therefore, span number 1 spans between abutment number 1 and pier number 1. Girders are numbered from left to right while looking towards increasing stations. This information should be consistent with as-built plans.

The inspector should note that some existing bridge inspection documentation may not have followed the convention stated above. In those cases, bridge inspectors should follow the existing convention for numbering abutments, piers, spans and girders to

maintain consistency with past inspections. However, this should be documented in the report for future reference.

- NBI item N90, Inspection Date, shall be the date of the field inspection. In the event of a multiple day inspection, N90 should correspond to the last day of inspection.

### 3.4.3.2 Characterization of Concrete Deterioration

Use the following terms, which are found in the FHWA Bridge Inspector's Reference Manual, when describing crack width, scaling or spalling of concrete elements:

Crack widths:

Describing cracks should include length, width, location, and intensity (few, numerous, etc.) To maintain consistency, it is essential to document crack width in the inspection notes using the following criteria:

- Hairline – crack width < 1/16 inch
- Narrow – crack width from 1/16 inch to 1/8 inch
- Medium – crack width from 1/8 inch to 3/16 inch
- Wide – crack width > 3/16 inch

Concrete scaling:

Scaling is the condition of concrete with gradual and continuing loss of mortar and aggregate over an area due to the chemical breakdown of the cement bond. Scaling is classified under the following four categories:

- Light or minor scaling – loss of surface mortar up to 1/4 inch deep, with a surface exposure of coarse aggregates.
- Medium or moderate scaling – loss of surface mortar from 1/4 inch to 1/2 inch deep, with mortar loss between the coarse aggregates.
- Heavy scaling – loss of mortar from 1/2 inch to 1 inch deep, with clearly exposed coarse aggregates.
- Severe scaling – loss of coarse aggregate particles, as well as surface mortar and the mortar surrounding the aggregates; depth of loss exceeds 1 inch; reinforcing steel is usually exposed.

Concrete spalling:

A spall is a circular or oval depression in concrete caused by a separation of a portion of the concrete surface. Spalls are classified as follows:

- Small – not more than 1 inch deep or approximately 6 inches in diameter.
- Large – more than 1 inch deep or greater than 6 inches in diameter.

### 3.4.3.3 Sections within the Bridge Inspection Report

The various sections within the Bridge Inspection Report are discussed in the following subsections:

#### 3.4.3.3.1 Deck

The following provides additional guidance when documenting deck inspection:

- NBI item N58, Overall Deck Condition Rating, shall be the lowest value of the Top Deck / Wearing Surface and the Deck Undersurface ratings. Top of deck rating shall refer to the structural condition of the deck. The condition of asphalt or other type of overlays should not be considered in the rating. Also, N58 coding should not be influenced by the condition of sidewalks, bridge railings, or deck joints.
- For culvert structures (“NBI item N43b = 19”), the Overall Deck Condition Rating, NBI item N58, shall always be “N”.
- If present, Sidewalk / Median / Curb description should correspond to data entered in NBI item 33, Bridge Median, and NBI item N50, Curb or Sidewalk Width.
- NBI item N108, Wearing Surface / Protective System, Arizona item A201, Wearing Surface Thickness, and the Element Level Inspection item must be coded consistently. If applicable, inspection personnel should verify the measurement of the overlay thickness in the field.
- The condition of joints between approach slabs and roadway pavement should be documented under Deck Inspection Notes as approach roadway joints.
- Typical hairline shrinkage cracks (crack width < 1/16 inch) in concrete curbs and railings do not need to be reported.
- An Overall Deck Condition Rating of 4 or less should trigger a repair recommendation.

#### 3.4.3.3.2 Superstructure

The following provides additional guidance when documenting superstructure inspection:

- For concrete slab bridge types, Main Members rating shall match NBI item N58, Overall Deck Condition Rating.
- When secondary members or bearing devices are not visible, their ratings should be “N” (not applicable). Their description may be copied from the as-built plans and a notation of “not visible” should be added to it.
- During an in-depth inspection, and if fracture critical members are present, the inspector should note whether or not any non-destructive testing was performed. Fracture critical members should be identified and documented within Arizona item A301, Structure Maintenance Notes. Also, the bridge inspection folder should contain a sketch identifying these members. The inspector must notify the Bridge Inspection Program Manager in the event the sketch is missing from the folder.
- Secondary members rating should not affect the Overall Superstructure Condition Rating.
- For routine inspections of steel structures, the inspector may add the following note when appropriate: “Since this is a routine inspection, not all of the comments made in the

previous in-depth inspection could be verified. However, they are transferred to this inspection report so that, if needed, they may be verified and updated during the next in-depth inspection.”

- Presence of lead in the paint on steel superstructure elements should be documented under Paint System – Description.
- Overhead cable lines crossing over the structure should be documented under Utilities. This is in addition to any utility attached to the structure. If applicable, the coding of NBI items N10 and N53, Minimum Vertical Clearance items, must be in accordance with the existence of such overhead utilities.

#### 3.4.3.3.3 Substructure

For non-waterway bridges, if the abutment slopes are armored, they shall be evaluated as slope protection. For waterway bridges, armored slope protection shall be evaluated as bank protection and included under waterway section of the inspection report.

#### 3.4.3.3.4 Waterway

The following provides additional guidance when documenting the Waterway section of the inspection report:

- If scour around pier or abutment is discovered during the inspection, the inspector should notify Bridge Hydraulics Section staff by checking the “Copy to BHS” box on the Summary of Bridges Inspected List (see Figure 3.3). A repair recommendation should not be generated.
- Dumped riprap or other dumped material along channel banks which is not designed as bank protection relative to size and toe-down depth should be coded as “N” under Bank Protection. Additionally, it should be clarified under “Description” that this dumped material was not designed as bank protection.
- Comments relating to channel stability should reflect the comparison of historical measurements as documented on channel profile diagrams.

#### 3.4.3.3.5 Roadway

The following provides additional guidance when documenting the Roadway section of the inspection report:

- The condition of joints between approach slabs and roadway pavement should be documented under Deck Inspection Notes as approach roadway joints.
- Erosion caused by roadway drainage must be documented in this section.
- Measured vertical under clearances must be shown on the Vertical and Horizontal Clearance Diagram. The minimum vertical under clearances, in each driving direction, must be noted under “Roadway/Safety Inspection Notes”.

#### 3.4.3.3.6 Appraisal Items

- If scour around pier or abutment is discovered during the inspection, the inspector should not change the coding of NBI item N113. Bridge Hydraulics Section staff should be notified by checking the “Copy to BHS” box on the Summary of Bridges Inspected List (see Figure 3.3). Bridge Hydraulics Section would determine whether the coding need to be changed and would prioritize any needed remedial action.
- For all scour critical structures (NBI item N113 = 3), the inspector should review the scour Plan of Action (POA). The Bridge Inspection Program Manager shall be notified immediately in the event that a copy of the POA is missing from the bridge file or the POA needs to be updated.

#### 3.4.3.3.7 Culverts

- Overall Deck Condition Rating, NBI item N58, shall always be “N”.
- NBI items N36a and N36b, Culvert Railings and Rail Transitions, should be set to “N” unless the fill height is less than 2 feet.
- Culverts’ structure length, NBI item N49, should be measured parallel to the roadway centerline, regardless of the skew of the headwalls. The measurement should be made between the inside faces of the exterior walls.
- NBI items N50a, N50b, N51, and N52, should be set to “0” unless the fill height is less than 2 feet.

#### 3.4.3.3.8 Other Miscellaneous Inspection Notes

- When applicable, the following items should be noted within this Section:
  - Initial inspection
  - In-depth inspection
  - Special equipment used during the inspection
  - Traffic control
  - Consultant firm name, contract and task order numbers
- The inspector shall note whether or not previous repair recommendations were implemented. The recommendations that were not implemented should be repeated if they were in accordance with current guidelines (see section 3.4.2).
- All maintenance items that are to be included in the List of Maintenance Items Report, see Figure 3.5, shall be listed under this subsection of the Inspection Report.
- The inspector shall list, on separate lines, the description of each of the photographs that are taken. The photograph description should be preceded by a sequential number corresponding to the number of the photograph as it was added to the inspection software. The file name may not be repeated in this section.

#### 3.4.3.3.9 Bridge Element Condition States

- Element condition states must be consistent with NBI item condition ratings.

- Observed cracks on top of decks should be coded under Element Number 358, Deck Cracking. Whereas cracks on underside of decks or superstructure soffits should be coded under Element Number 359, Soffit of Concrete Decks and Slabs.
- For scour critical structures, an appropriate condition state of Element Number 361, Scour, should be selected.
- Element Number 362, Traffic Impact, should not be used to indicate damage to bridge railing.

#### 3.4.4 Vertical and Horizontal Clearance Diagram

The clearance diagram shall graphically document lateral and vertical clearances. Measurements entered in the database should be coded in feet including decimal points; for example, 16.5 would be the correct coding for a 16'-6" measurement.

The following should be adhered to when preparing clearance diagrams:

- Vertical clearances shall be measured from items attached to the superstructure such as lights and signs if they result in lower vertical clearances. If measurements were copied from as-built plans, the inspector must document same with a note below the diagram.
- When updating previous measurements, and in the event those are different, the inspector should cross-out the existing value and write the updated value next to it.
- Depending on accessibility and the type of inspection that is being performed, the inspector may not be able to verify the previous measurements. In that event, this should be noted below the diagram.
- Vertical clearance signs are required if the minimum vertical clearance is equal or less than 16'-3". A repair recommendation should be created stating that a vertical clearance sign is needed and specifying the clearance as the measurement minus 3". The 3 inch is a buffer zone accounting for vehicle bounce.
- When a new vertical clearance measurement conflicts with an existing posted sign, the inspector should consult with the Bridge Inspection Program Manager prior to issuing a repair recommendation.
- The inspector should create a new Vertical and Horizontal Clearance Diagram whenever the existing diagram becomes difficult to read. If certain measurements cannot be taken due to inaccessibility or other reasons, previous values should be transposed to the new diagram and should be clearly labeled as such.
- Posting a vertical clearance sign, where two or more structures are located close to each others, is governed by the lowest vertical clearance measurements of each of the structures. In some cases, this may lead to a posting attached to the structure with a higher vertical clearance than the other(s). In this event, the inspector must clearly document the structure that controls the vertical clearance on all structures' diagrams; also, address this fact in the Roadway Inspection Notes.
- When a vertical clearance sign is required for a structure that crosses over both direction of traffic, one of the two following cases shall apply:
  - No raised median: posted signs in both direction of traffic should reflect the same minimum vertical clearance.

- Raised median: each direction of traffic may have a different vertical clearance sign.
- Lateral under-clearance should be measured from edge of travel lane to:
  - The face of an obstruction such as pier, abutment walls, traffic barrier, or face of curb; for relatively flat ground.
  - The toe of slopes steeper than 1:3, regardless of whether the slope is going up or down.
- The inspector should be aware that widened structures may require new vertical and horizontal clearance measurements.

### 3.4.5 Channel Profile Diagram

This diagram shall graphically document the cross-section profile underneath the bridge. The diagram is not required for concrete lined channels.

The following should be adhered to when preparing channel diagrams:

- The inspector should make every effort to draw up to five successive diagrams on the same sheet to allow for a better understanding of changes in the channel profile over time.
- Vertical measurements should be taken at intervals of quarter spans and should be from the lowest point of the superstructure to the ground elevation underneath. For spans shorter than 40 feet, the inspector may omit quarter and three-quarter point measurements. If measuring from the top of the deck, usually due to inaccessibility, the depth of the superstructure should be subtracted from the measured value. Typically, these measurements should be taken at the upstream or downstream side of the bridge and the corresponding location should be noted on the diagram. It is important to consistently take measurements on the same side of the bridge. If this cannot be accomplished, a new diagram sheet should be created.

### 3.4.6 Sketches

Sketches should be prepared whenever they are needed to better illustrate a condition encountered during the field inspection. A field condition that cannot be appropriately documented with photographs and written observations would require a sketch to be generated. An example of a needed sketch is when the inspector is trying to convey deteriorated areas of a bridge deck. A sketch could delineate and show dimensions of the affected areas. Another situation that may require a sketch is collision damage to a girder. Appendix A has an example of an inspection sketch.

### 3.4.7 Inspection Photographs

#### 3.4.7.1 General

Photographs identifying the bridge roadway (Roadway ID), bridge elevation (Elevation ID), typical deck condition (top and bottom if possible), typical expansion or hinge joints if applicable, bridge elements requiring repair or maintenance, and any additional necessary features (such as weight limit signs or other signs) shall be obtained. These photographs are referenced below as the standard photographs.

Previously recommended repairs that were completed since the last inspection should also be documented through photographs.

Inspection personnel must not take an excessive number of photographs. For example, a single typical photograph of similar cracks would suffice.

#### 3.4.7.2 Guidance for Taking Inspection Photographs

- Inspection personnel should strive to obtain the best possible photographs with utmost clarity and exposure.
- Photographs should not be included unless they are being referenced in inspection notes. The only exceptions are the following five standard photograph types: Roadway ID, Elevation ID, Deck Wearing Surface (including culverts with less than 2 feet of fill height), Structure Undersurface (soffit), and Deck Joint.
- When taking a photograph documenting the roadway or the elevation, it is useful to select an opposite direction to the previous inspection photograph.
- Roadway photographs should clearly show all lanes on the structure wearing surface. If there are two directions of travel, then the photograph should show both directions on the structure. For unusually wide structures, a separate photograph for each direction of travel may be taken instead and appropriately labeled.
- Inspectors should not refer to photographs taken during previous inspections. Instead, new photographs should be taken.
- Whenever possible, a photograph of an element requiring repair should be taken and referred to in the text of the repair recommendation.
- If the structure is posted for weight limit or other restrictions, include a photograph from both approaches showing said restrictions.
- Whenever a previously suggested repair is complete, a photograph must be taken to document said completion. In addition, the inspector should document with a statement in the inspection report.
- A list of all photographs that were taken during the inspection shall be included as a last item under “Other Miscellaneous Inspection Notes” of the Inspection Report. The list should be sequential and should contain the description of each photograph.

#### 3.4.7.3 Digital Photograph Naming Convention

- All file names must contain 8 digits + “.” + “jpg”
- The first 5 digits should indicate the structure number including leading zeros (type the number “0” not the letter “O”).

- The 6th and 7th digit should indicate the inspection number.
- The 8th and final digit should distinctly identify each photograph for that inspection by using sequential letters of the alphabet (Type “A”, “B”, “C”, etc...)

Examples:

1. During the 22nd inspection of structure number 1280, five photos were taken. The five file names should be: 0128022A.jpg, 0128022B.jpg, 0128022C.jpg, 0128022D.jpg, and 0128022E.jpg.

2. During the 4th inspection of structure number 25, three photos were taken. The three file names should be: 0002504A.jpg, 0002504B.jpg, and 0002504C.jpg.

### 3.4.8 Camera Location Diagram

A Camera Location Diagram, see Figure 3.6, is required to better orient the reader and reduce confusion when interpreting the inspection photographs. The inspector should decide if this diagram is needed. The diagram is not required if only standard bridge photographs are taken during the inspection.

Appendix A shows an example of the Camera Location Diagram, a plan view of the bridge should be drawn with encircled photo numbers denoting the numbering sequence that was documented in the inspection report. The photo numbers should be written within the circle.

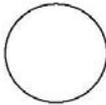
Figure 3.6 – Camera Location Diagram

Arizona Department of Transportation  
**BRIDGE GROUP**  
SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT  
CAMERA LOCATION DIAGRAM

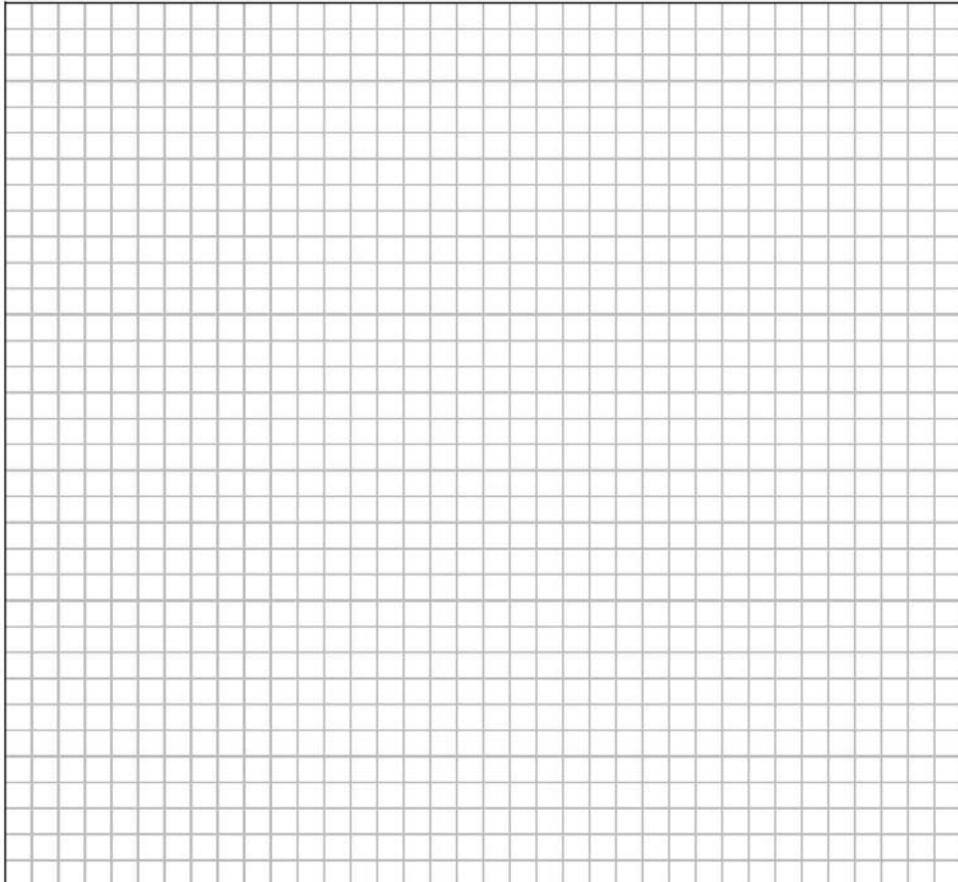
Structure Name

Structure Number

Route Number  MP

  
**North**

Inspection No.	
Inspection Date	
Name	



## **4 BRIDGE INSPECTION LIFECYCLE**

When planning an inspection, inspection teams shall assemble bridges into packets. Bridge records are checked-out based on these packets. The lifecycle of a packet consists of the following milestones:

- Field inspection, report writing and submittal to the Bridge Management Section (BMS) review team (6 weeks)
- Inspection review by BMS (4 weeks)
- Comment reconciliation and final submittal by inspection team (2 weeks)

The completion of the field inspection of the first bridge in a packet marks the beginning of the 12-week lifecycle of a bridge inspection packet. This lifecycle procedure applies to all inspections, whether performed by in-house staff or consultants, and shall be observed unless an exemption is granted by the Bridge Inspection Program Manager.

## **5 CRITICAL FINDINGS**

A critical finding is an observed condition that, if not promptly corrected, could result in the partial or total failure of the bridge. The Bridge Inspection Program Manager must be immediately alerted of any critical findings. The FHWA should be informed of those as well and their resolutions. The inspector should consult with the Bridge Inspection Program Manager prior to issuing a critical repair recommendation. Critical repair recommendations are equivalent to Repair Task Priority of 1 (Refer to Figure 3.4).

In the event that the bridge must be closed, the inspection team should first contact the appropriate District or Local Agency depending on structure ownership. Then the Bridge Inspection Program Manager should be informed.

## **6 QUALITY ASSURANCE AND CONTROL**

Independent office review of bridge inspection documents will be performed to enhance quality assurance. Review engineers must select at least 10% of each packet of bridges to be reviewed. All inspection packets shall be reviewed regardless of bridge ownership and whether ADOT personnel or consultants performed the inspections. The following are some of the criteria that shall be used when selecting inspections to be reviewed:

- Initial Bridge Inspections
- Bridges designated as Structurally Deficient
- Bridges with Fracture Critical Members
- Bridges with one or more condition rating that changed by 2 points or more
- Change in sufficiency rating prefix (i.e., from blank to S or F, or vice versa)
- Change in vertical or horizontal clearance that may affect NBI items
- Inspections that produce repair recommendation

Bridge inspection personnel are reminded that assuring quality during their field inspection and throughout their documentation is their responsibility. The independent office review of bridge inspections is provided to maintain consistency throughout the state and shall not replace the due diligence that an inspector must exercise while performing and documenting each bridge inspection. Special attention should be accorded to pattern errors. Since the review may not entail every inspection report in a submitted packet, some errors may be repeated in non-reviewed reports. Therefore, the inspector must correct non-reviewed reports for similar types of comments.

The quality of the bridge inspection program will be controlled through regularly scheduled training workshops, random office review of inspection documents, independent and concurrent field review of inspections, and independent field inspection conducted specifically for calibration purposes.

In addition, the FHWA conducts an annual review of the bridge inspection program.

## **APPENDIX A – SAMPLE OF BRIDGE INSPECTION DOCUMENTS**

This appendix contains samples of the following bridge inspection documents:

- Structure Inventory and Appraisal (SI&A) Report
- Repair Report
- List of Maintenance Items
- Inspection Report
- Vertical and Horizontal Clearance Diagram
- Channel Profile Diagram
- Sketches
- Inspection Photographs
- Camera Location Diagram

These samples are provided to maintain consistency between inspection teams. They are not meant to restrict the individuality of each bridge inspection. They are intended to be used as guidance for a typical inspection of a typical Arizona bridge. Some of these documents were created for illustration purposes and are not based on actual inspections. Not all examples are related to the same bridge.

Date Printed: 4/14/2008

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**BRIDGE GROUP**  
**Structure Inventory & Appraisal**

Structure Number: <b>2190</b>		Structure Name: <b>40th Street TI UP</b>		Feature Under: <b>I 10</b>	
Route: <b>10 MP 152.08</b>		Road Name: <b>40th Street</b> Agency: <b>ADOT</b>		Location: <b>2.87 mi E of Jct I 17</b>	

LOCATION INFORMATION		DIMENSIONS		PROPOSED IMPROVEMENTS	
N1-State Code:	049	N32-Appr Rdwy Width (feet):	52	N75-Type of Work:	
N2-State Hwy District:	78	N48-Max Span Length (feet):	170	N76-Length of Str Imp (feet):	377
N3-County Code:	013	N49-Structure Length (feet):	343	N94-Br Improv Cost (x1000):	\$2,868
N4-Place Code:	00260	N50a-Lt Curb/Swlk Width (feet):	6	N95-Rdwy Improv Cost (x1000):	\$615
N16-Latitude:	33 deg 28.8 min	N50b-Rt Curb/Swlk Width (feet):	8	N96-Total Project Cost (x1000):	\$4,822
N17-Longitude:	111 deg 59.0 min	N51-Br Width Curb-Curb (feet):	52	N97-Year of Cost Estimate:	2007
N98-Border St Code - % Resp:	- 0	N52-Deck Width Out-Out (feet):	126.8	<b>CONSTRUCTION PROJECT DATA</b>	
N99-Border Bridge Number:		N112-NBIS Br Length?	Y	N27-Year Built:	1989
INVENTORY ROUTE DATA		VERTICAL and HORIZONTAL CLEARANCE		N106-Year of Reconstruction:	0000
N19-Detour Length (miles):	1	N53-Min Vert Over Clr (feet):	16.61	A204-Orig Project Number:	IR-10-3(312)
N20-Toll:	3	N54-Min Vert Under Clr (feet):	H 16.61	A205-Orig Project Station:	8022+24.67
N28-Lanes On / Under:	8 / 10	N55-Min Lat Under Clr Rt (feet):	H 10.4	A223-TRACS Number:	
	<i>2nd Record</i>	N56-Min Lat Under Clr Lt (feet):	10.4	A225-Deck Area (sq. feet):	43492
N5-Inv Rte: 1 5 0 00000 0 - 2 1 1 00010 0		SERVICE, TYPE, and SPAN INFORMATION		A226-Superstr Unit Cost:	\$52
N10-Inv Rte Min Vert Clr (feet):	16.61 17.24	N42-Service Type:	5 1	A227-Substr Unit Cost:	\$5
N11-Inv Rte Milepoint:	0 152.08	N43-Str Type, Main:	4 02	INSPECTION	
N26-Functional Class:	16 11	N44-Str Type, Appr:	0 00	N90-Inspection Date:	4/23/2007
N29-Avg Daily Traffic:	32800 291000	N45-Number of Main Spans:	2	N91-Insp Freq (months):	24
N30-Year of ADT:	2007 2005	N46-Number of Appr Spans:	0	A207-Inspection Quarter:	5
N47-Inv Rte Tot Horiz Clr (feet):	52 99.9	CONDITION RATINGS		A208-Inspection Number:	9
N100-Defense Hwy:	0 1	N58-Deck:	7	A228-Next Insp Date:	Quarter 1, 2009
N101-Parallel Bridge:	N N	N59-Superstructure:	5	CRITICAL FEATURES	
N102-Direction of Traffic:	2 2	N60-Substructure:	7	N92A-Fracture Critical:	N 0
N104-Hwy System:	0 1	N61-Channel:	N	N92B-Underwater Insp:	N 0
N109-Percent Truck Traffic:	10 11	N62-Culvert:	N	N92C-Special Insp:	N 0
N110-National Truck Network:	0 1	APPRAISAL RATINGS		N93A-Date Fract Crit Insp:	0
N114-Future ADT:	32810 291010	N67-Struct Evaluation:	7	N93B-Date Underwtr Insp:	0
N115-Year of Future ADT:	2027 2020	N68-Deck Geometry:	5	N93C-Date Spec Insp:	0
A200-Is N5 the Princ. Rte?	N Y	N69-Underclearance Rtg:	5	A234-Steel In-Depth Insp Freq (mo):	48
RESPONSIBILITY		N71-Waterway Adequacy:	N	CULVERT INFORMATION	
N21-Maint Responsibility:	01	N72-Appr Rdw Align:	8	A217-Culv Barrel Height (feet)	0
N22-Bridge Owner:	01	N36-Traffic Safety Features:	1 1 1 1	A218-Culv Length (feet):	0
A203-ADOT Org Number:	7873	BRIDGE SCOUR DATA		A219-Culv Fill Height (feet):	0
A224-Insp Team Number:	1	N113-Scour Critical Rtg:	N	BRIDGE RAILING	
A229-Agency:	ADOT	A202-Foundation Type:	9 1	A206a-Bridge Rail Type:	9
NAVIGATION		A220-Found Embed (feet):	0	A206b-Geometric Conform:	1
N38-Navigation Control:	N	A221-Scour Countermeasure:		A206c-Structural Conform:	1
N39-Nav Vert Clr (feet):	0	LOAD, RATE, and POST		SUFFICIENCY RATING	
N40-Nav Horiz Clr (feet):	0	N31-Design Loading:	5	Sufficiency Rating:	69.39
N111-Nav Pier/Abut Prot:		N41-Open, Post, Close:	A	GENERAL COMMENTS	
N116-Nav Min Vert Clr (feet):	0	N63-Method Used for Oper. Rtg.:	2		
GENERAL DATA		N64-Operating Load Rtg:	2 - 52		
N33-Bridge Median:	2	N65-Method Used for Inv. Rtg.:	2		
N34-Skew:	0	N66-Inventory Load Rtg:	2 - 36		
N35-Structure Flared:	0	N70-Bridge Posting:	5		
N37-Historical Significance:	5	N103-Temp Str Designation:			
N107-Deck Str Type:	1	A211-Posted Limit (Tons):	0		
N108-Wear Surf Prot System:	1 0 0	A222-Date of Load Rtg:			
A201-Wear Surf Thickness (inches):	0	A233-Posted Vert Clr NB/EB (ft-in):	15 - 9		
		A233-Posted Vert Clr SB/WB (ft-in):	15 - 9		

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**BRIDGE GROUP**

**Bridge Repair Report**

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Structure Number:	<b>2190</b>	Structure Name:	<b>40th Street TI UP</b>	Inspected By:	<b>B&amp;N: JMC, BJP</b>
Route:	<b>10</b>	Road Name:	<b>40th Street</b>	Inspection Number:	<b>9</b>
MilePost:	<b>152.08</b>	Agency:	<b>ADOT</b>	Date of Inspection:	<b>Monday, April 23, 2007</b>
ADOT District:	<b>Phoenix</b>	District Org:	<b>7873</b>	Next Insp. Due By:	<b>Quarter 1, 2009</b>

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**Recommendation Number:** 1

Bridge Element:	107	Painted Steel Open Girder/Beam	Actual Completion Cost:	<input type="text"/>
Quantity:	60	LF	Cost Estimate: \$20,000	
Repair Priority:	3 - Repair Work that Can Be Scheduled		Completion Date:	<input type="text"/>

**Heat-straighten Girder #1 over eastbound lanes. Replace damaged cross-frames. Stiffeners with cracks should be retrofitted to prevent crack propagation. Monitor locations with cracks initiated until repairs are done. Bridge Group will initiate a repair project to address this problem on priority basis.**

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Maintenance Authority: Please return a copy of this report after entering the requested information in the shaded rectangular areas to the Bridge Management Section, MD 261E, 205 S. 17th Ave., Phoenix, AZ, 85007.

**Arizona Department of Transportation  
Bridge Group  
List of Maintenance Items**

Str. No.	Structure Name	Rt.	MP	Description of Maintenance Items
603	Camelback Rd TI UP	17	203.93	1. Clean clogged bridge deck drains. 2. Repair damaged approach concrete barrier at NE end. 3. Patch potholes over deck.
604	Bethany Home TI UP	17	204.93	1. Repair pedestrian fence at SW corner of bridge.
820	Deer Valley TI OP NB	17	215.97	1. Replace missing luminaries under bridge superstructure at east side.
1118	Deer Valley TI OP SB	17	215.97	1. Repair approach guardrail end treatment at NW corner. 2. Replace missing drainage grating at SE corner of the deck.
790	Skunk Creek Bridge	17	219.11	1. Trim tree branches over deck at NW corner.

<b>District:</b>	Globe	<b>Org. Number:</b>	8888	<b>Packet Number:</b>	9999
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<b>Inspected by:</b>	John Doe	<b>Date:</b>	8/30/2010
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Date Printed: 4/14/2008

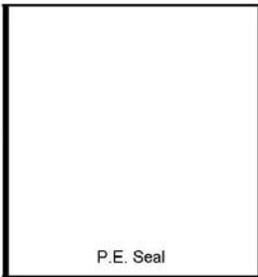
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**BRIDGE GROUP**

**Bridge Inspection Report**

Structure Number:	2190	Structure Name:	40th Street TI UP	Inspected By:	B&N: JMC, BJP
Route:	10	Road Name:	40th Street	Inspection No:	9
MilePost:	152.08	Agency:	ADOT	Date of Insp.:	Monday, April 23, 2007
ADOT District:	Phoenix	District Org:	7873	Next Insp. Due By:	Quarter 1, 2009



**N58 - Deck** Overall Rating: 7 - Good

Top Deck / Wearing Surface	7 - Good	bare concrete
Deck Undersurface	7 - Good	concrete
Sidewalk / Median / Curb	7 - Good	concrete sidewalks on both sides & 2' concrete median
N36a - Bridge Railings	1 - Meets Standards	
N36b - Rail Transitions	1 - Meets Standards	Conc. barrier for vehicle/ped. separation and conc. parapet with fence for ped. protection
Deck Joint	6 - Satisfactory	standard b24.20 compression seal
Drainage System	N - Not Applicable	drainage grates are located at far four corners of approach slab

Overall Deck Inspection Notes:

1. Deck has hairline transverse and longitudinal cracks.
2. Soffit has hairline transverse cracks with leaching at cracks and at construction joint near the median. There are transverse cracks with efflorescence under the W deck overhang.
3. Sidewalk has random hairline transverse and longitudinal cracks. Sidewalks have minor debris. There are minor transverse cracks in the median. There is spall in the east parapet at the north joint.
4. Concrete barriers have minor vertical cracks.
5. Joints are partially filled with debris and the compression seal is sagging at the southwest corner, and to a lesser extent in other locations throughout. There is a 1/2" minor bulge in the compression seal at the southeast corner sidewalk.
6. Deck joint openings at 75 F:
  - South abutment: West side: 2" & East side: 2"
  - North abutment: West side: 2" & East side: 2".

**N59 - Superstructure** Overall Rating: 5 - Fair

Main Members	6 - Satisfactory	welded plate girders
Secondary Members	5 - Fair	steel angle cross-brace diaphragms
Bearing Devices	8 - Very Good	2" thick neoprene pads and fixed bearings
Paint System	8 - Very Good	Grey paint does not contain lead
Utilities	8 - Very Good	1" conduit at N and S abutment

Overall Superstructure Inspection Notes:

1. The west exterior girder (Girder #1) has sustained severe collision damage in Span #1 over the eastbound lanes. The girder bottom flange and the bottom of the girder web are bent to the east at least 5 inches, and 5 of the cross-frames and multiple transverse stiffeners are buckled and deformed, with some of the cross-frame gusset plates severed. Between Girders #1 and #2 in Span #1: the 3rd X-frame from the pier is fractured, the 4th X-frame from the pier is severely distorted, the 5th X-frame from the pier is bent with a cracked gusset plate and a cracked stiffener, and all of the intermediate stiffeners between and North and South of these X-frames are crimped or bent to the side or otherwise buckled. Cracks have been initiated at the location of the 1st stiffener south of the 3rd X-frame from the pier and in the stiffener that attaches the 4th X-frame from the pier. At the point of impact, the collision damage extends past the first bay to the X-frame between Girders #2 and #3 (3rd X-frame south of pier) [See photos and repair report]. This has caused the drop in the superstructure ratings.
2. Minor scrape marks in bottom of all Girders of span #1.
3. There is minor surface rust at the connections between the diaphragms and girders.
4. Bearings have no significant deficiencies.
5. There are no fracture critical members on this structure. Fatigue prone details include cross-frames attached to the girders' welded vertical stiffeners. Welds are in good condition, no cracks noted.

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BRIDGE GROUP

Bridge Inspection Report

Structure Number: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: <b>B&amp;N: JMC, BJP</b>
Route: <b>10</b>	Road Name: <b>40th Street</b>	Inspection No: <b>9</b>
MilePost: <b>152.08</b>	Agency: <b>ADOT</b>	Date of Insp.: <b>Monday, April 23, 2007</b>
ADOT District: <b>Phoenix</b>	District Org: <b>7873</b>	Next Insp. Due By: <b>Quarter 1, 2009</b>

**N60 - Substructure** Overall Rating: **7 - Good**

Abutment	<b>7 - Good</b>	stub on drilled shafts
Piers	<b>7 - Good</b>	Concrete cap over 6 "Y" columns on spread footings.
Slope Protection	<b>8 - Very Good</b>	exposed aggregate paving
Wingwalls, Dados, etc.	<b>8 - Very Good</b>	concrete dados and wingwalls

Overall Substructure Inspection Notes:

1. Abutments have minor vertical and horizontal cracks throughout.
2. There is debris and refuse on the bridge seats.
3. Pier barrier protection in Span #1 has a 10ft long scrape mark and small area of concrete spall due to impact damage.
4. There is minor spalling in pier cap due to traffic impact. Pier cap has typical minor hairline map cracks.
5. Wingwalls have minor hairline map cracks.

**N61 - Waterway** Overall Rating: **N - Not Applicable**

Channel	<b>N - Not Applicable</b>
Bank Protection	<b>N - Not Applicable</b>

Overall Waterway Inspection Notes:

**Roadway / Safety**

Approaches	<b>7 - Good</b>	concrete slabs; AC roadway
Fills	<b>8 - Very Good</b>	earth fill
N36c - Approach Rail	<b>1 - Meets Standards</b>	guardrail on ramps & approach
N36d - Rail Ends	<b>1 - Meets Standards</b>	
Signing	<b>7 - Good</b>	V.C. EB 15'-9"; WB 15'-9" and overhead highway sign
Lighting	<b>8 - Very Good</b>	4 fixtures underneath, 2 light poles on the bridge
A211-Posted Weight	<b>0 tons</b>	

Overall Roadway / Safety Inspection Notes:

1. Approach slabs have typical hairline longitudinal cracks.
2. There are large sized cracks in the northwest approach parapet at the north joint.
3. Since the measured minimum vertical clearance is greater than 16'-3", vertical clearance sign is not required per ADOT policy.

**Appraisal Items**

<b>N67 - Structural Evaluation</b>	<b>7 - Better than Present Minimum Criteria</b>
<b>N68 - Deck Geometry</b>	<b>5 - Somewhat Better than Minimum Adequacy</b>
<b>N69 - Vert. and Horiz. Clearances</b>	<b>5 - Somewhat Better than Minimum Adequacy</b>

Date Printed: 4/14/2008

ARIZONA DEPARTMENT OF TRANSPORTATION

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BRIDGE GROUP

Bridge Inspection Report

Structure Number: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: <b>B&amp;N: JMC, BJP</b>
Route: <b>10</b>	Road Name: <b>40th Street</b>	Inspection No: <b>9</b>
MilePost: <b>152.08</b>	Agency: <b>ADOT</b>	Date of Insp.: <b>Monday, April 23, 2007</b>
ADOT District: <b>Phoenix</b>	District Org: <b>7873</b>	Next Insp. Due By: <b>Quarter 1, 2009</b>

**N71 - Waterway Adequacy**                      **N** - Not Applicable

**N72 - Approach Roadway Alignment**      **8** - Equal to Present Desirable Criteria

**N113 - Scour Critical**                         **N** - Bridge NOT over Waterway

Overall Appraisal Items Notes:

Other Miscellaneous Inspection Notes:

1. This is an in-depth inspection that was completed by Burgess & Niple, an on-call consultant, under Task Order 8 of Contract 06-19. Access to the structure was accomplished by use of a bucket truck with lane merge traffic control setup on route below bridge. Hours for this inspection are as follows: mobilization = 3 hours, vertical clearance/channel profile diagram = 3 hours, inspection = 8 hours, and report = 6 hours. Subconsultant costs for the inspection are as follows: Bucket truck = \$300, traffic control = \$2000.
2. One repair recommendation has been made. See repair report. One previous repair recommendation regarding vertical clearance sign change has been completed.
3. Inspection photographs include the following: roadway ID, elevation ID, deck surface, deck underside, joint condition and repair recommendation.
4. A special inspection was performed on this structure after an accident damaged the west exterior girder (primarily) on May 12th, 2006. A hard copy of this report is available in the file folder for this structure.

**Bridge Element Condition Rating**

Elem #	Description	Env	Unit	Total Qty	Cond 1	Cond 2	Cond 3	Cond 4	Cond 5
12	Concrete Deck - Bare	2	EA	1	1	0	0	0	0
107	Paint Stl Opn Girder	2	LF	5487	5487	0	0	0	0
205	R/Conc Column	2	EA	6	6	0	0	0	0
215	Reinforced Conc Abutment	2	LF	216	216	0	0	0	0
234	Reinforced Conc Cap	2	LF	214	214	0	0	0	0
302	Compression Joint Seal	2	LF	216	0	216	0	0	0
310	Elastomeric Bearing	2	EA	32	32	0	0	0	0
313	Fixed Bearing	2	EA	16	16	0	0	0	0
321	Reinforced Concrete Approach Slab w/ or w-o/AC Ov	2	EA	2	2	0	0	0	0
331	Reinforced Concrete Bridge Railing	2	LF	686	686	0	0	0	0
358	Deck Cracking	2	EA	1	1	0	0	0	0
362	Traffic Impact	2	EA	1	0	0	1	0	0

ARIZONA DEPARTMENT OF TRANSPORTATION

PAGE \_\_\_\_\_ OF \_\_\_\_\_

**BRIDGE GROUP**  
**SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT**  
**VERTICAL & HORIZONTAL CLEARANCE DIAGRAM**

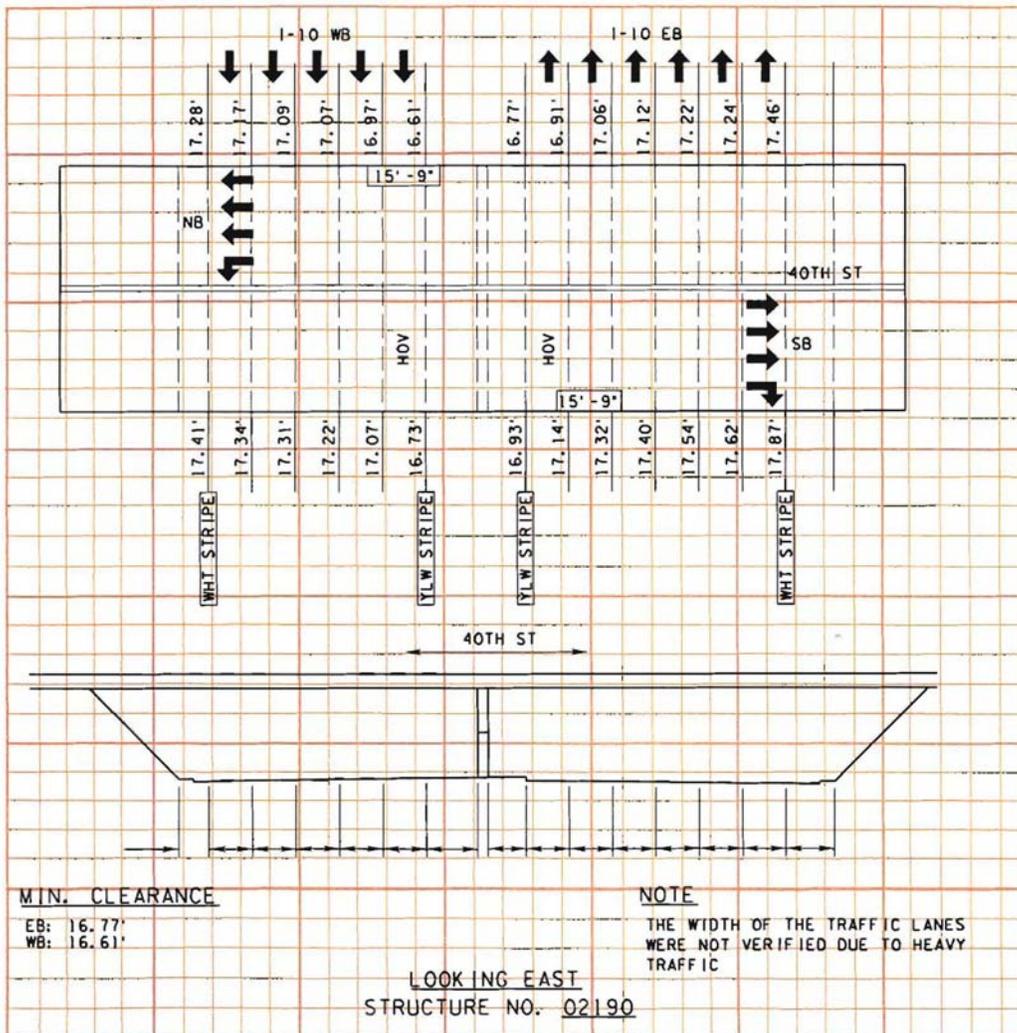
STRUCTURE NAME 40<sup>th</sup> Street TI UP

STRUCTURE NO. 2190

LOCATION 10 152.08  
ROUTE MILEPOST



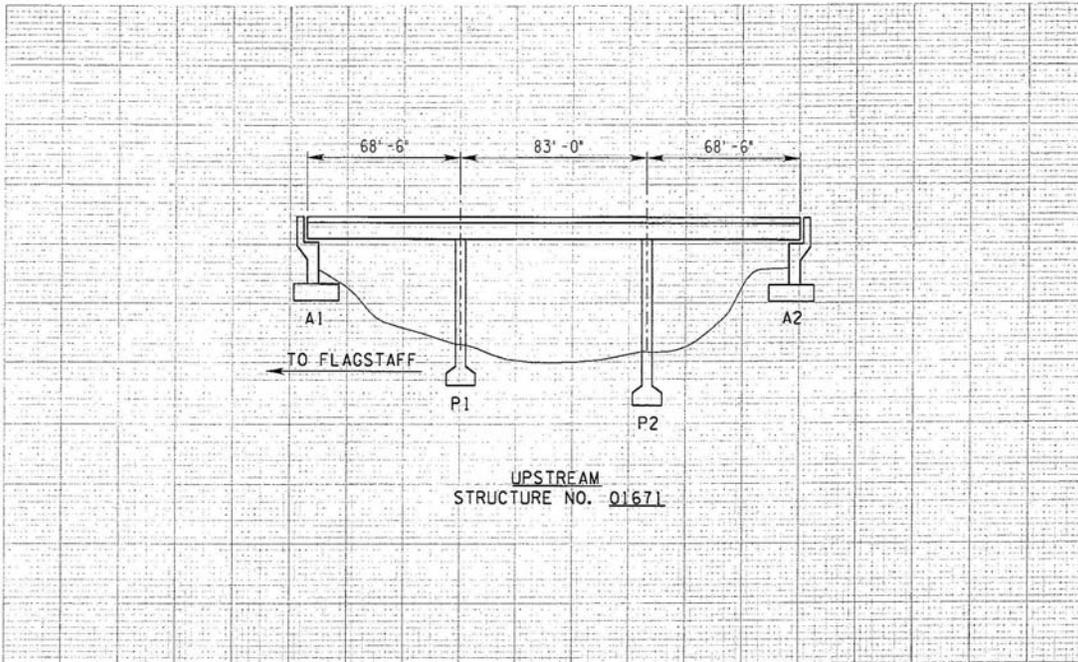
INSPECTION	9				
DATE	4/23/07				
INITIAL	JMC BSP				
NEW /REVISED DIAGRAM	New				



Name of Structure: Canyon Diablo Br EB  
 Structure No. 1671  
 Location: Route I-40 MP 229.90

**Channel Profile Diagram**

Arizona Department of Transportation  
 Bridge Group  
 Supplemental Page to Bridge Inspection Report

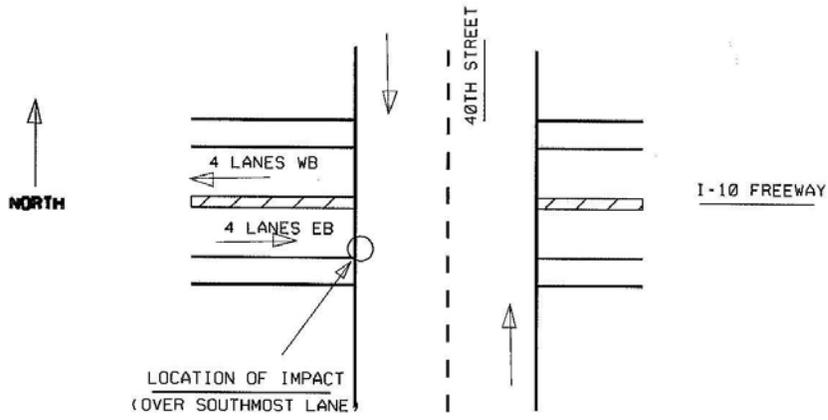


Insp. No.	Insp. date	Inspector's Initial	Channel Profile Location (U/S or D/S)	Depth at Abut. 'A1' face or at Support, 'P' (RHS)	Depth at quarter span	Depth at mid span	Depth at 3/4 span	Depth at the left side of Support 'P'	Depth at the right side of Support 'P'	Depth at quarter span	Depth at mid span	Depth at 3/4 span	Depth at the left side of Support 'P'	Depth at the Right side of Support 'P'	Depth at quarter span	Depth at mid span	Depth at 3/4 span	Depth at Abut. 'A2' face or at Support, 'P' (LHS)
19	9/12/04	SPS	US	4'0"	11'10"	19'6"	38'9"	44'2"	46'0"	51'0"	52'8"	50'10"	49'0"	48'0"	46'0"	37'1"	27'0"	10'1"

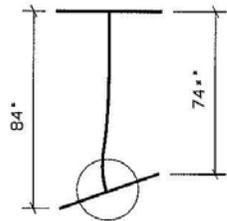
† 64-4505 R04/03 Note: Channel depths will be measured from the bottom of the girder or the slab; For short span (<40'), depths at quarter & three-quarter lengths may not be necessary; Local scour, if observed at locations other than above, will be noted on this sheet with inspection date; RHS-->Right Hand Side; LHS--> Left Hand Side.

Sketch:

**DAMAGE TO EASTMOST STEEL GIRDER AND ASSOCIATED ELEMENTS**  
**(STRUCTURE #2190 AT I-10 AND 40TH STREET)**  
**ELEMENTS NOT TO SCALE**

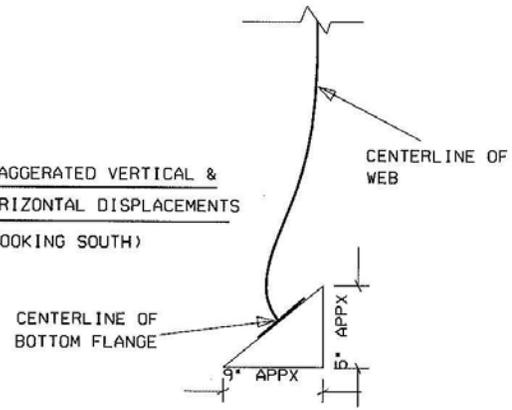


SECTION OF APPROXIMATE TORSIONAL DISPLACEMENT - LOOKING SOUTH



ABOUT 9 FEET LENGTH OF LONGITUDINAL DISTORTION WAS OBSERVED IN THE IMMEDIATE VICINITY OF SOUTHMOST LANE

EXAGGERATED VERTICAL & HORIZONTAL DISPLACEMENTS (LOOKING SOUTH)



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**BRIDGE GROUP**

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**Bridge Inspection Photographs**

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Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: B&N: JMC, BJP
Route: <b>10</b>	Road Name: 40th Street	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: ADOT	Date of Insp.: 4/23/2007
ADOT District: Phoenix	District Org.: 7873	Next Insp. Due By: 3/31/2009

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**Photo No.:** 1  
**File Name:** 0219009A.jpg  
**Descriptions:** Roadway ID looking south

Date Printed: 4/14/2008

ARIZONA DEPARTMENT OF TRANSPORTATION  
**BRIDGE GROUP**

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**Bridge Inspection Photographs**

Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: <b>B&amp;N: JMC, BJP</b>
Route: <b>10</b>	Road Name: <b>40th Street</b>	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: <b>ADOT</b>	Date of Insp.: <b>4/23/2007</b>
ADOT District: <b>Phoenix</b>	District Org.: <b>7873</b>	Next Insp. Due By: <b>3/31/2009</b>



**Photo No.:** 2  
**File Name:** 0219009C.jpg  
**Descriptions:** Elevation ID looking west

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**BRIDGE GROUP**

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**Bridge Inspection Photographs**

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Structure No.:	<b>2190</b>	Structure Name:	<b>40th Street TI UP</b>	Inspected By:	B&N: JMC, BJP
Route:	<b>10</b>	Road Name:	40th Street	Inspection No.:	<b>9</b>
MilePost:	<b>152.08</b>	Agency:	ADOT	Date of Insp.:	4/23/2007
ADOT District:	Phoenix	District Org.:	7873	Next Insp. Due By:	3/31/2009

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**Photo No.:** 3  
**File Name:** 0219009E.jpg  
**Descriptions:** Typical deck wearing surface

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ARIZONA DEPARTMENT OF TRANSPORTATION  
**BRIDGE GROUP**

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**Bridge Inspection Photographs**

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Structure No.:	<b>2190</b>	Structure Name:	<b>40th Street TI UP</b>	Inspected By:	B&N: JMC, BJP
Route:	<b>10</b>	Road Name:	40th Street	Inspection No.:	<b>9</b>
MilePost:	<b>152.08</b>	Agency:	ADOT	Date of Insp.:	4/23/2007
ADOT District:	Phoenix	District Org.:	7873	Next Insp. Due By:	3/31/2009

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**Photo No.:** 4  
**File Name:** 0219009B.jpg  
**Descriptions:** General underside (looking south in span 3)

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ARIZONA DEPARTMENT OF TRANSPORTATION  
**BRIDGE GROUP**

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**Bridge Inspection Photographs**

Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: <b>B&amp;N: JMC, BJP</b>
Route: <b>10</b>	Road Name: <b>40th Street</b>	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: <b>ADOT</b>	Date of Insp.: <b>4/23/2007</b>
ADOT District: <b>Phoenix</b>	District Org.: <b>7873</b>	Next Insp. Due By: <b>3/31/2009</b>



**Photo No.:** 5  
**File Name:** 0219009D.jpg  
**Descriptions:** Typical expansion joint (at north abutment)

Date Printed: 4/14/2008

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**BRIDGE GROUP**

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**Bridge Inspection Photographs**

Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: B&N: JMC, BJP
Route: <b>10</b>	Road Name: 40th Street	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: ADOT	Date of Insp.: 4/23/2007
ADOT District: Phoenix	District Org.: 7873	Next Insp. Due By: 3/31/2009



**Photo No.:** 6  
**File Name:** 0219009S.jpg  
**Descriptions:** Bottom flange of girder #1, span #1, bent to the east by collision damage

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ARIZONA DEPARTMENT OF TRANSPORTATION  
**BRIDGE GROUP**

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**Bridge Inspection Photographs**

Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: <b>B&amp;N: JMC, BJP</b>
Route: <b>10</b>	Road Name: <b>40th Street</b>	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: <b>ADOT</b>	Date of Insp.: <b>4/23/2007</b>
ADOT District: <b>Phoenix</b>	District Org.: <b>7873</b>	Next Insp. Due By: <b>3/31/2009</b>



**Photo No.:** 7  
**File Name:** 0219009N.jpg  
**Descriptions:** Fourth cross-frame from pier in span #1, between girders #1 and #2; crushed by collision damage, with gusset plate sheared

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**Bridge Inspection Photographs**

Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: <b>B&amp;N: JMC, BJP</b>
Route: <b>10</b>	Road Name: <b>40th Street</b>	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: <b>ADOT</b>	Date of Insp.: <b>4/23/2007</b>
ADOT District: <b>Phoenix</b>	District Org.: <b>7873</b>	Next Insp. Due By: <b>3/31/2009</b>



**Photo No.:** 8  
**File Name:** 02190090.jpg  
**Descriptions:** Crack initiated by collision damage in stiffener weld at 4th cross-frame from pier at girder #1, span #1.

Date Printed: 4/14/2008

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**Bridge Inspection Photographs**

Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: B&N: JMC, BJP
Route: <b>10</b>	Road Name: 40th Street	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: ADOT	Date of Insp.: 4/23/2007
ADOT District: Phoenix	District Org.: 7873	Next Insp. Due By: 3/31/2009



**Photo No.:** 9  
**File Name:** 0219009F.jpg  
**Descriptions:** Collision damage to third cross-frame from pier at girder #1; bent and cracked gusset plate; bent girder stiffener

Date Printed: 4/14/2008

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**Bridge Inspection Photographs**

Structure No.: <b>2190</b>	Structure Name: <b>40th Street TI UP</b>	Inspected By: <b>B&amp;N: JMC, BJP</b>
Route: <b>10</b>	Road Name: <b>40th Street</b>	Inspection No.: <b>9</b>
MilePost: <b>152.08</b>	Agency: <b>ADOT</b>	Date of Insp.: <b>4/23/2007</b>
ADOT District: <b>Phoenix</b>	District Org.: <b>7873</b>	Next Insp. Due By: <b>3/31/2009</b>



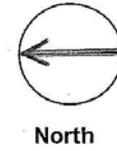
**Photo No.:** 10  
**File Name:** 0219009G.jpg  
**Descriptions:** Distortion of girder #1 and buckled stiffeners due to collision damage

Arizona Department of Transportation  
**BRIDGE GROUP**  
**SUPPLEMENTAL PAGE TO BRIDGE INSPECTION REPORT**  
**CAMERA LOCATION DIAGRAM**

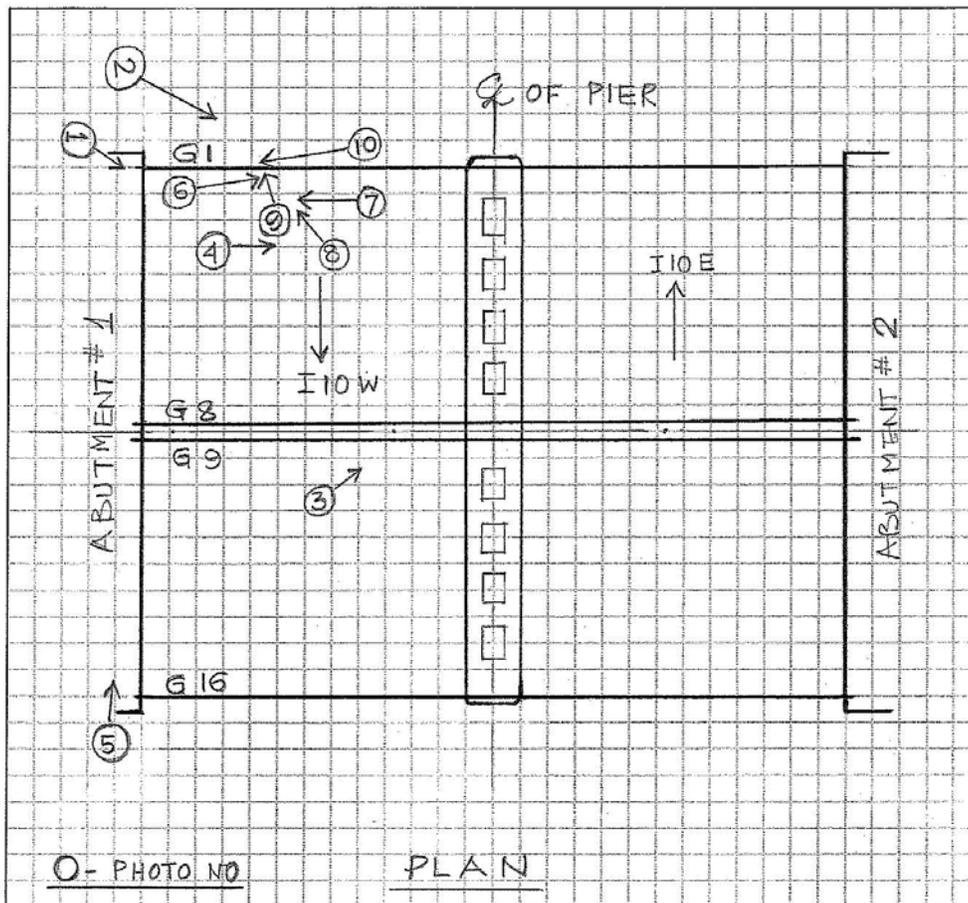
Structure Name 40<sup>th</sup> Street TI UP

Structure Number 2190

Route Number 10 MP 152.08



Inspection No.	9
Inspection Date	4/23/2007
Name	John Doe



**APPENDIX B – SAMPLE QUARTERLY PROGRESS REPORT**

This appendix contains two samples of the Quarterly Progress Report. The first sample is blank and the second one is filled.

## SAMPLE QUARTERLY PROGRESS REPORT (BLANK FORM)

Transmittal of Quarterly Bridge Inspection Information to ADOT Bridge Management Section

<b>Agency Name:</b>				
<b>Name of Person Providing Information:</b>				
<b>Date Information Provided:</b>				
	<b>Quarter</b>	<b>Year ----&gt;</b>		
<b>Please highlight the quarter being updated</b>	1	January 1st to March 31st		
	2	April 1st to June 30th		
	3	July 1st to September 30th		
	4	October 1st to December 31st		
			<b>Comments:</b>	
No. of bridges inspected during the quarter:				
No. of culverts inspected during the quarter:				
No. of overdue bridge inspections at end of the quarter:				
No. of overdue culvert inspections at end of the quarter:				
No. of new NBI bridges added to the inventory during the quarter: <sup>a</sup>				
No. of new NBI culverts added to the inventory during the quarter: <sup>b</sup>				
No. of bridges deleted from the inventory during the quarter: <sup>c</sup>				
No. of culverts deleted from the inventory during the quarter: <sup>d</sup>				
No. of critical findings during the quarter: <sup>e</sup>				
Total no. of bridges in the inventory at the end of quarter:				
Total no. of culverts in the inventory at the end of quarter:				
<b>Provide a list of structure numbers that correspond to the above fields:</b>				
a:				
b:				
c:				
d:				
e:				
Please send the form electronically to =====> <a href="mailto:BridgeInfo@azdot.gov">BridgeInfo@azdot.gov</a>   Attention: Bridge Inspection Program Manager				
Alternatively mail to =====> ADOT Bridge Management Section, 205 South 17th Avenue, M/D 613E, Phoenix, AZ 85007				

## SAMPLE QUARTERLY PROGRESS REPORT (FILLED FORM)

Transmittal of Quarterly Bridge Inspection Information to ADOT Bridge Management Section

<b>Agency Name:</b>		<b>City of New Found Land</b>	
<b>Name of Person Providing Information:</b>		<b>Fortune Taylor</b>	
<b>Date Information Provided:</b>		<b>06/10/09</b>	
		<b>Quarter</b>	<b>Year ----&gt; 2009</b>
<b>Please highlight the quarter being updated</b>	<b>1</b>	<b>January 1st to March 31st</b>	
	<b>2</b>	<b>April 1st to June 30th</b>	
	<b>3</b>	<b>July 1st to September 30th</b>	
	<b>4</b>	<b>October 1st to December 31st</b>	
		<b>Comments:</b>	
<b>No. of bridges inspected during the quarter:</b>		<b>84</b>	Overdue inspections are always completed first in the next quarter before starting scheduled inspections of that quarter.
<b>No. of culverts inspected during the quarter:</b>		<b>67</b>	
<b>No. of overdue bridge inspections at end of the quarter:</b>		<b>6</b>	
<b>No. of overdue culvert inspections at end of the quarter:</b>		<b>17</b>	
<b>No. of new NBI bridges added to the inventory during the quarter: <sup>a</sup></b>		<b>1</b>	
<b>No. of new NBI culverts added to the inventory during the quarter: <sup>b</sup></b>		<b>3</b>	
<b>No. of bridges deleted from the inventory during the quarter: <sup>c</sup></b>		<b>1</b>	
<b>No. of culverts deleted from the inventory during the quarter: <sup>d</sup></b>		<b>0</b>	
<b>No. of critical findings during the quarter: <sup>e</sup></b>		<b>0</b>	
<b>Total no. of bridges in the inventory at the end of quarter:</b>		<b>756</b>	
<b>Total no. of culverts in the inventory at the end of quarter:</b>		<b>517</b>	
<b>Provide a list of structure numbers that correspond to the above fields:</b>			
<b>a:</b> 12001			
<b>b:</b> 12156, 12157 and 12158			
<b>c:</b> 12011			
<b>d:</b>			
<b>e:</b>			
Please send the form electronically to =====> <a href="mailto:BridgeInfo@azdot.gov">BridgeInfo@azdot.gov</a>   <b>Attention: Bridge Inspection Program Manager</b>			
Alternatively mail to =====> <b>ADOT Bridge Management Section, 205 South 17th Avenue, M/D 613E, Phoenix, AZ 85007</b>			