CRITICAL INSPECTION FINDINGS

The most important duty of a bridge inspector is to ensure the safety of the traveling public.

The timely reporting of a critical inspection finding (CIF) is essential in preventing premature permanent closing or collapse of bridges by promoting expedient repair, strengthening or shoring. Equally important is the remedial actions or repairs performed when such findings are reported.

The procedures to follow when a CIF is discovered have been established to ensure that proper reporting and follow-up actions are performed. These procedures are different for state-system and off-system inspections and have been listed separately.

It is intended that CIF matters be handled as expediently as possible. The time frames indicated in the procedures below are necessary to meet the FHWA, Missouri Division guidelines on follow-up of critical inspection findings.

CRITICAL INSPECTION FINDING CRITERIA

Any of the following inspection findings must be reported immediately using the procedures listed below. For bridges closed prior to the inspection, all of the procedural steps need not be followed. However, for closed bridges an informational CIF form should be filled out to document obvious deficiencies, the approved status of the bridge, and CIF resolution through closing the bridge by the owner or agency having jurisdiction over the route.

1. Bridge with recommendations for immediate (within 1 week) work on any Fracture Critical Member (FCM).

2. Bridge with recommendations for immediate (within 1 week) correction of scour or hydraulic problems.

3 Bridges with recommendations for immediate (within 1 week) work to prevent substantial reduction in safe load capacity.

4. Bridges with condition ratings lowered to values as follow:

A.	Item 59, Superstructure	2 or Less
B.	Item 60, Substructure	2 or Less
C.	Item 61, Bank and Channel	2 or Less
D.	Item 62, Culvert	2 or Less
E.	Item 113, Scour	2 or Less
F.	Item 58, Deck	2 or Less

STATE-SYSTEM PROCEDURES

Once a CIF is reported, the division and district must develop a plan of action which ensures the safety of the traveling public and minimizes public inconvenience. This MHTD Action Plan should be executed with minimal delay.

This procedure shall be used to report all critical inspection findings, record the MHTD Action Plan, track all follow-up actions performed, and to report MHTD Action Plan completion.

1. Immediately notify the Assistant Division Engineer - Bridge Maintenance of any condition meeting CIF criteria.

2. Report findings using form shown in Figure 2.1 The initial report shall be complete to date for all inspection data and actions taken. The initial distribution shall be completed within 60 days of the inspection. The initial distribution shall include a completed Structure Inventory and Appraisal sheet.

   It is possible that all corrective actions will be complete prior to the initial distribution. In this case, the initial distribution will also serve as the final report.

   Distribution shall be as follows:

   A. Assistant Division Engineer - Bridge Maintenance

   B. Federal Highway Administration - Missouri Division

   C. Division Engineer - Bridges

   D. District Engineer

   E. Assistant to the Chief Engineer - Operations

   F. Division Engineer - Maintenance and Traffic

3. The MHTD Action Plan shall be determined jointly by the division and the district. The MHTD Action Plan shall be recorded on a form as shown in Figure 2.1 and distributed as outlined above within 90 days of the inspection. District and Division responsibilities shall be assigned in the action plan.

4. Distribution as outlined above shall follow all changes in the MHTD Action Plan.

5. A review of the bridge inspection data will follow completion of MHTD Action Plan items and necessary changes made to the inspection records.

NON-STATE SYSTEM PROCEDURES

This procedure shall be followed for all Critical Inspection Findings (CIFs) for bridges located on public roads which are not owned or maintained by MoDOT.

1. The inspector shall report the finding immediately to the district office (District Non-State Bridge or Liaison Engineer, as appropriate) by radio or telephone. The inspector's immediate recommendations shall be conveyed. These recommendations shall be recorded on the CIF report, Figure 2.2. The inspector shall complete sections 1 and 2 of the report within 3 days of the inspection date and send to the district office with an informational copy also being sent to the Bridge Division. If consultants operating under a statewide contract being administered by MoDOT are performing the inspection, this will normally end their involvement.

   In the event that the local agency is performing the inspections with their own consultant or in-house staff, the inspector shall immediately contact both the local agency and the actual bridge owner (if known) as defined in Section 2. The inspector shall then complete Sections 1 and 2 of the CIF report within 3 days of the inspection date and mail an informational copy to the district office and the Bridge Division.

2. The district shall immediately notify the local agency and bridge owner (if known) by telephone or other means. The district recommendations shall be conveyed to the local agency and bridge owner at this time. These recommendations shall be recorded on the CIF report. The contact with these entity (s) shall be documented on the CIF report. The local agency is defined as the normal and customary organizational contact for the purposes of MoDOT's non-state inspection program. Normally, the local agency contact for off-system bridges will be the county or, in some cases, large cities in urban centers. Although not always the case, the local agency will usually also own the bridge. The bridge owner can be defined as the entity that has authority to order a bridge closed or repaired. An example of a local bridge owner could be a special road district, village, or small municipality within a county. In some cases, the local agency or a political subdivision may not actually own the bridge (such as a bridge owned by a railroad, for example), but can effect closure of the bridge due to its control of the route or jurisdiction over the traffic approaches to the bridge.

   If the local bridge owner immediately closes or repairs the bridge, the inspection report should be modified accordingly and no further follow-up is necessary. However, if the local bridge owner does not immediately close or repair the bridge, MoDOT follow-up action shall consist of these actions:

A. Within 7 days of the inspection date the district will notify the local agency by letter with a copy to the bridge owner (if known, or can readily be determined), including a copy of the CIF report. The letter shall advise the local agency:

1) To take steps to either cause closure of the bridge to traffic or repair of a certain component of the bridge.
2) That repairs or closure should occur as soon as possible.
3) That resources are available in the form of the BEAP program to recommend repairs.
4) That they should notify the district office when the bridge is closed or repaired.
5) That federal bridge funds may be suspended to the local agency if the CIF is not resolved and the district is not notified within 30 days of the inspection date.
6) If the local agency or bridge owner chooses to close the structure, the closure should physically restrict traffic from using the bridge and a "bridge closed" sign should be erected 500 feet in front of the bridge. The intentions of the local agency regarding future repair or replacement should be included on the CIF form.

B. The district is expected to follow-up the CIF to confirm resolution within the 30-day time frame. If the local agency does not appropriately resolve the CIF within the above 30-day time frame and the district is unable to obtain cooperation through discussions, the Bridge Division should be contacted by the district for assistance in suspending federal funds to the local agency.

C. When notified of the local agency or bridge owner's resolution, the district shall field check the bridge and verify the repair or the closure and submit the following information to the Bridge Division:

1) Copy of CIF Report
2) Copy of biennial inspection report
3) Copy of all correspondence with local bridge owner
4) Photos of the repair or closing
5) 8½" x 11" copy of a portion of a map showing bridge location

D. The Bridge Division will review all submitted information for concurrence that the bridge may be reopened to traffic and to recommend a new load posting. In cases of noncompliance, the Offices of Transportation Program Management and Resource Management may be notified to suspend federal funds to the local agency involved until the critical inspection finding is properly resolved.

E. At the proper resolution of a critical inspection finding the Bridge Division will forward copies of all the information listed in B. to the FHWA, if required.

BRIDGE AND CULVERT RATING GUIDELINES
INTRODUCTION

The following guidelines were established to promote some degree of uniformity in the ratings between bridge inspectors.

Conditions listed under the various ratings will be sufficient, but not necessary conditions to arrive at the particular rating. Ratings lower than indicated in the guidelines may be given if justified.

The assigning of a particular rating will only indicate that action is required or desired. It will not imply that action will be taken or is pending.

Bridges completed but not open to traffic shall be rated as if open to traffic for condition and appraisal ratings. Design values should be used where necessary, such as for ADT.

CONDITION RATING DEFINITIONS

In order to promote uniformity between bridge inspectors, these guidelines will be used to rate Items 58 (Deck), 59 (Superstructure), 60 (Substructure), 61 (Bank and Channel Protection), and 62 (Culvert).

These ratings will be based on the existing condition of the bridge as compared to its "as built" condition. The load carrying capacity will not be used in evaluating condition items. The fact that a bridge was designed for less than current legal loads and may be posted shall have no influence upon condition ratings.

The determination of which ratings apply to each of the items will be based on evaluation of all relevant factors and information. When rating an item, it is not necessary that all listed conditions be met to arrive at a numerical rating. It is recognized that there are unique situations where judgment will be required.

Portions of bridges that are being supported or strengthened by temporary members will be rated based on their actual condition, i.e. the temporary members are not considered in the rating of the item.

Completed bridges not yet opened to traffic, shall be rated as if opened to traffic.

The FHWA definition and MoDOT comments for the condition ratings are listed below. Additional MoDOT guidelines for each condition rating is listed under each item; 58, 59, 60, 61, and 62.

Rating	**FHWA definition.**	**MoDOT comment.**
9	Excellent condition.	
8	Very good condition – no problems noted. Potential exists for minor preventive maintenance.	
7	Good condition – some minor problems. Potential exists for minor maintenance.	
6	Satisfactory condition – structural elements show some minor deterioration. Potential exists for major maintenance.	
5	Fair condition – all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour. Potential exists for minor rehabilitation.	
4	Poor condition – advanced section loss, deterioration, spalling, or scour. Potential exists for major rehabilitation. Blocking or shoring may be necessary as a precautionary measure.	
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. Repair or rehabilitation required immediately.	CRITICAL INSPECTION FINDING for ITEM 59, 60, 61,

CONDITION RATING DEFINITIONS (Continued)

Rating	FHWA definition. MoDOT comment.
	or 62 may be warranted. Blocking or shoring may be necessary, not precautionary, for structure to remain open to traffic.
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 bridge until corrective action is taken. CRITICAL INSPECTION FINDING for ITEM 59, 60, 61, or 62. The need for repair or rehabilitation is urgent. Facility should be closed until the indicated repair is complete.
1	"Imminent" failure condition – major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put back in light service. CRITICAL INSPECTION FINDING for ITEM 59, 60, 61, and 62. Facility is closed. Study should determine the feasibility for repair.
0	Failed condition – out of service – beyond corrective action. Facility is closed and is beyond repair.
N	Not applicable.

APPRAISAL RATING DEFINITIONS

The intention of the "Appraisal" section is to evaluate a bridge in relation to the service level of the highway system. The bridge will be compared to a new bridge built to the current standards for that particular type of road as further defined below.

Items 67, 68, 69, 71, and 72 will be coded with a one-digit code that indicates the appraisal rating for the item.

Rating	FHWA definition
9	Superior to present desirable criteria.
8	Equal to present desirable criteria.
7	Better than present minimum criteria.
6	Equal to present minimum criteria.
5	Somewhat better than minimum adequacy to tolerate being left in place as is.
4	Meets minimum tolerable limits to be left in place as is.
3	Basically intolerable requiring high priority for corrective action.
2	Basically intolerable requiring high priority of replacement.
1	This value for rating code not used.
0	Bridge closed.
N	Not applicable.

Note: Items 67, 68, and 69 will be coded by CENTRAL OFFICE PERSONNEL FOR OFF-SYSTEM INSPECTIONS.

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 58 (CONDITION)

INTEGRAL AND NON-INTEGRAL DECK

GENERAL

The condition of the worst span of the deck will dictate the DECK rating. The expansion devices or wearing surface (seal, mat, latex or low slump overlay, running boards, etc.) will not influence the DECK rating.

When the span has an integral deck (rigid frame, slab, deck girder, voided slab, box girder, precast slab, prestressed concrete double tee, prestressed concrete I-girder, open-spandrel arch, or orthotropic deck), the DECK rating may influence the SUPERSTRUCTURE rating. Decks in truss spans without stringers act as slab spans and may also influence the SUPERSTRUCTURE rating. The DECK rating will not affect the SUPERSTRUCTURE rating for steel girder superstructures with composite slabs.

For the influence an integral deck has on a SUPERSTRUCTURE rating, see DETERMINATION OF RATING, ITEM NO. 59 (CONDITION).

Any steel girder bridge, including ones with a composite design, will be considered as non-integral decks for rating purposes, and their condition will not influence the SUPERSTRUCTURE rating.

Other deck types (e.g. timber, steel gird, concrete non-composite) will be considered as non-integral decks, and their condition will not influence the SUPERSTRUCTURE rating.

Comprehensive rehabilitation of the deck, including a dense concrete overlay, may raise the DECK rating by one or two.

Code N for Culverts

Rating 9: Excellent Condition

A. No deficiencies noted.

Rating 8: Very good condition. *Potential exists for minor preventive maintenance.*

A. Concrete deck.

1. No noteworthy deficiencies that affect the condition of the deck.
2. No spalling, scaling, or delamination.
3. No water saturation.
4. Minor transverse or longitudinal cracking.

BRIDGE INSPECTION RATINGS
INTEGRAL AND NON-INTEGRAL DECK, ITEM NO 58 (Continued)

B. Timer plank or laminated deck.

1. No rotten or crushed wood.
2. No splitting of timber.
3. Timber rightly secured to floor system.

C. Steel decking.

1. No rusting of steel decking.
2. Steel decking tightly secured to floor system.

Rating 7: Good Condition. *Potential exists for minor maintenance.*

A. Concrete deck.

1. Deck cracks with or without efflorescence, including transverse cracks in P/C panels (cracks are sealable).
2. Reflective cracks over precast panels or L-cracks between Dbl-Tee beams (cracks are sealable).
3. Light scaling (1/4" depth or less).
4. Visible wear in the wheel lines.
5. Minor water saturation. This area would include any repaired areas and/or minor areas in need of repair.
6. Minor popouts.
7. Minor lifting of non-composite deck off beams due to pack rust.
8. Small areas of shallow delamination.
9. Minor edge deterioration with no rebar exposed.

B. Timber plank or laminated deck.

1. Minor cracking or splitting of wood.
2. Deck is loose at a few locations. Deck has few loose planks.

C. Steel decking.

1. Minor rusting of steel deck.
2. Steel deck loose at a few locations.

Rating 6: Satisfactory condition. *Potential exists for major maintenance.*

A. Concrete deck.

1. Minor spalling of the deck.
2. Medium scaling (1/4" – ½" in depth).
3. Up to 10% of the deck is water saturated and/or deteriorating. This area would include any repaired areas and/or areas in need of repair.
4. Deterioration of deck edges or outlets with spalling and rebar exposed.
5. Excessive number of open cracks (excessive being at 5' intervals or less over the majority of a span) with or without efflorescence.

6. Extensive lifting of deck off beams (no damage).
7. Noteworthy areas of delamination to rebar.
8. Pounding of deck with no signs of distress.
9. Numerous t-cracks in precast panels, with or without efflorescence.

B. Timber plank deck or laminated deck.

1. Few rotten or crushed boards in need of replacement.
2. Many boards are cracked or split.
3. Boards are loose at many locations.

C. Steel decking.

1. Widespread rusting of steel deck with indications of initial section loss.
2. Steel deck is loose at many locations with some pounding.

Rating 5: Fair Condition. *Potential exists for minor rehabilitation.*
Capacity for carrying wheel loads not reduced.

A. Concrete deck.

1. Deck has many spalls, some of which may expose rebar.
2. Excessive cracking resulting in spalling.
3. Heavy scaling (1/2" – 1" in depth).
4. 10%-40% of the deck is water saturated and/or deteriorating.
   This area would include any repaired areas and/or areas in need of repair.
5. Disintegration of deck edges or outlets that is still outside curb line. Loss of linear deck edge.
6. Excessive amount of pack rust lifting non-composite deck off beams with some cracking of the deck.
7. Considerable delamination to rebar.
8. Deck pounds when loaded and showing signs of distress.

B. Timber plank or laminated deck.

1. Numerous rotten or crushed boards in need of replacement.
2. Numerous boards cracked or split.
3. Majority of boards are loose.

C. Steel decking.

1. Heavy rusting of steel decking with areas of section loss.
2. Steel deck is loose and pounding at numerous locations.

BRIDGE INSPECTION RATINGS
INTEGRAL AND NON-INTEGRAL DECK, ITEM NO. 58 (Continued)

Rating 4: Poor Condition. *Potential exists for major rehabilitation.*
Capacity for carrying wheel loads slightly reduced.

A. Concrete deck.

1. Considerable spalling of the deck.
2. 40%-60% of the deck is water saturated and deteriorating.
   This area would include any repaired areas and/or areas in need of repair.
3. Heavy disintegration of the deck edges that encroaches inside curb line. .
4. Abutment or concrete pavement pressure causing severe damage, usually requiring the deck ends to be removed and replaced.
5. Extensive delamination to rebar.
6. Severe pounding of deck when loaded – damage evident.

B. Timber plank deck.

1. Majority of the planks are rotten, crushed and/or splitting, necessitating the replacement of the entire deck.

C. Steel decking.

1. Heavy rusting of steel decking resulting in areas of advanced section loss and/or holes developing through deck.
2. Much of steel deck is loose. Considerable pounding of decking.

Rating 3: Serious Condition. *Repair or rehabilitation required immediately.*
Capacity for carrying wheel loads in question.

A. This rating will apply if severe or critical signs of structural distress are visible.

B. More than 60% of the deck is water saturated and/or deteriorated **and** the deck is in need of repair or is showing structural distress. This area would include any repaired areas and/or areas in need of repair. Saturation alone, without structural distress or need for deck repair, should be rated 4.

C. Bridge may warrant one-lane traffic or load restriction.

D. Heavy rusting of steel decking resulting in extensive section loss and numerous holes through deck. Load transfer of wheel loads to superstructure in question.

Rating 2: Critical Condition. *The need for repair or rehabilitation is urgent.* Facility should be closed until the indicated repair is completed.

A. Deck span on verge of collapse or section has failed.

Rating 1: "Imminent" Failure Condition – facility is closed. *Study should determine the feasibility for repair. Corrective action may put structure back into light service.*

Rating 0: Failed Condition – facility is closed and is beyond repair. *Replacement of structure is necessary.*

Rating N: Not applicable. *Use for culverts.*

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 59 (CONDITION)

SUPERSTRUCTURE

GENERAL

The SUPERSTRUCTURE rating will be dictated by the condition of the worst superstructure span.

The condition of the paint system on steel structures will not influence this rating. Likewise, the condition of joints or bearings should not affect this rating, except in extreme cases.

The SUPERSTRUCTURE rating will never affect the DECK rating. However, when the superstructure span has an integral deck (rigid frame, slab, deck girder, voided slab, box girder, precast slab, prestressed concrete double tee, prestressed concrete I-girder, open-spandrel arch, or orthotropic deck), the DECK rating may influence the SUPERSTRUCTURE rating. The DECK rating will not affect the SUPERSTRUCTURE rating for steel girder superstructures with composite slabs.

In arriving at the SUPERSTRUCTURE rating of a bridge with an integral deck, a comparison must be made of the lowest rated deck span with the rating of the worst superstructure span. If the DECK rating is determined to be lower than the SUPERSTRUCTURE rating, the condition rating for SUPERSTRUCTURE is downgraded to the same level as the DECK rating. Comprehensive rehabilitation of the superstructure will normally restore the SUPERSTRUCTURE rating to 7 or possibly an 8.

Successful fatigue crack retrofits should not be considered as deficiencies when determining this rating.

Code N for all culverts.

Rating 9: Excellent Condition.

A. No deficiencies noted.

Rating 8: Very Good Condition. *Potential exists for minor preventive maintenance.*

A. No noticeable or noteworthy deficiencies that affect the condition of the superstructure.

B. Insignificant collision or drift damage.

Rating 7: Good Condition. *Potential exists for minor maintenance.*

A. Minor cracking, splitting, or decay of timber beams or stringers at insignificant locations.

B. Hairline cracking of prestressed concrete girders, concrete deck girders, precast slab stems, etc.

C. Minor leaching through concrete diaphragms at girder encasements of integral bents.

D. Minor longitudinal or transverse movement of superstructure or non-integral deck.

E. Rusting of structural steel members with no noteworthy section loss.

Rating 6: Satisfactory Condition. *Potential exists for major maintenance.*

A. Some decay, cracking, splitting, or crushing of timber beams or stringers.

B. Cracking of prestressed concrete girders with no deterioration or disintegration.

C. Cracking of concrete deck girders, precast slab stems, etc., with minor deterioration or disintegration. Exposure of main reinforcement due to spalling or scaling with surface rust or very minor pitting in reinforcing steel.

D. Minor saturation of superstructure.

E. Heavy leaching through concrete diaphragms at girder encasements of integral bents.

F. Considerable longitudinal or transverse movement of superstructure or deck.

G. Minor (but not critical) collision damage to truss members.

H. Initial section loss of structural steel support elements in non-critical stress areas.

I. A few small fatigue cracks in compression zones of non-fracture critical members.

J. Isolated shear cracks in prestressed beams with no appreciable effect on the structural integrity of the bridge.

K. Unequal transfer of load from girders to bearings due to build up of pack rust under bearings.

Rating 5: Fair condition. *Potential exists for minor rehabilitation.*
No affect on structural capacity.

A. Considerable amount of decay, cracking, splitting, or crushing of timber members but elements are still fairly sound.

BRIDGE INSPECTION RATINGS
SUPERSTRUCTURE, ITEM NO. 59 (Continued)

B. Open cracking of prestressed concrete girders with areas of minor deterioration, but no disintegration.

C. Shear cracks in a few prestressed beams with no appreciable affect on the structural integrity of the bridge.

D. Considerable open cracking of concrete girders, concrete deck girders, precast slab stems, etc., with areas of disintegration or deterioration. Exposure of main reinforcement with initial section loss in reinforcing steel.

E. Saturation of superstructure with some leaching.

F. Pack rust bulging hanger pin plates, hanger straps, hanger plates or splice plates on trusses.

G. Initial section loss of structural steel in critical stress areas of primary members.

H. Widespread (but not critical) collision damage to truss members.

I. Several locations of cracking in compression zones of non-fracture critical members.

J. A few cracks in tension areas of non-fracture critical members or in compression zones of fracture critical members.

K. Extremely heavy rust build-up under bearings causing damage to other bridge elements.

Rating 4: Poor Condition. *Potential exists for major rehabilitation.*
Some affect on load capacity. Blocking or shoring may be required as precautionary measure.

A. Excessive decay, cracking, splitting, or crushing of timber beams or stringers.

B. Open cracking of prestressed concrete girders with moderate deterioration or minor disintegration. Cracking indicates capacity of girders may be reduced.

C. Heavy disintegration, deterioration, saturation, or leaching of concrete deck girders, precast slab units, etc. Considerable section loss in exposed reinforcing steel.

D. Extremely heavy rust build-up under bearings causing damage to other bridge elements.

E. Advanced section loss of structural steel in critical stress areas.

BRIDGE INSPECTION RATINGS
SUPERSTRUCTURE, ITEM NO. 59 (Continued)

F. Pack rust on hanger pin joints causing bulging and failure of bolts or welds. Advanced section loss around hanger pin connections. Severe pack rust on hanger straps causing excessive bowing of straps. Advanced section loss in hanger plates. Pack rust on splice plates causing excessive bulging , ripping or cracking.

G. Critical collision damage to truss members. Precautionary measures may need to be taken.

H. Numerous areas of cracking in compression zones of non-fracture critical members.

I. Several locations of cracking in tension zones of non-fracture critical members or in compression zones of fracture critical members.

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Rating 3: Serious Condition. *Repair or rehabilitation required immediately.* Capacity of superstructure reduced. May require blocking, shoring or load restrictions to remain in service.

A. Any condition described in Rating 4, which is of a severe magnitude or for which blocking, shoring or load restrictions are necessary.

B. Disintegration or damaged condition of primary superstructure elements requiring shoring, lane reduction, or load restriction.

C. Any shear crack or combination of shear cracks that affect the structural integrity of the bridge.

D. Severe section loss of structural steel in critical stress areas affecting load capacity.

E. Cracks in tension zones of fracture critical members.

F. Cracking of non-fracture critical members that is severe in magnitude.

Rating 2: Critical Condition. CRITICAL INSPECTION FINDING. The need for repair or rehabilitation is urgent. Facility should be closed until the indicated repair is completed.

Follow procedures outlined in CRITICAL INSPECTION FINDINGS in this section.

A. Advanced shear cracking in prestressed concrete girders, concrete deck girders, precast slab units, etc.

B. Severe fatigue cracking in fracture critical members.

C. Structure on verge of collapse or portion of superstructure has failed.

BRIDGE INSPECTION RATINGS
SUPERSTRUCTURE, ITEM NO. 59 (Continued)

Rating 1: "Imminent" Failure Condition – facility is closed. CRITICAL INSPECTION FINDING. *Study should determine feasibility for repair. Corrective action may put structure back into light service.*

Rating 0: Failed Condition – facility is closed and beyond repair. *Replacement of structure is necessary.*

Rating N: Not applicable. *Use for culverts.*

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 60 (CONDITION)

SUBSTRUCTURE

GENERAL

The condition rating for SUBSTRUCTURE will be dictated by the condition of the worst substructure unit.

Substructure units on non-integral structures, will be considered to be the backwall and that portion below the bearings. For structures where the substructure and superstructure are integral, the substructure unit will be considered that portion below the superstructure element.

The superstructure element of structures where the superstructure is integral with the substructure will not influence the SUBSTRUCTURE rating. (e.g., the DECK or SUPERSTRUCTURE rating of a slab, deck girder, etc., will not influence the SUBSTRUCTURE rating, even though a portion of the deck or superstructure may be designed over the columns as a bent cap). Where diaphragms are poured integrally with concrete or steel girders, the substructure will be the portion below the diaphragm.

Comprehensive rehabilitation of substructure units will normally restore the substructure unit to a rating of 7 or possibly an 8.

Code N for culverts. However, for reporting comments, distinguish the substructure portion of a culvert as the walls and bottom slab.

Rating 9: Excellent Condition.

A. No deficiencies noted.

Rating 8: Very Good Condition. *Potential exists for minor preventive maintenance.*

A. No noticeable or noteworthy deficiencies that affect the condition of the substructure.

B. Insignificant damage caused by drift or collision damage (e.g., scrape marks or spalls on concrete, not exposing steel; scrape marks on steel not causing misalignment).

Rating 7: Good Condition. *Potential exists for minor maintenance.*

A. Insignificant cracking of concrete units.

B. Light to moderate scaling on concrete or masonry units.

C. Insignificant delaminations or spalling of concrete masonry units that may expose reinforcing steel.

D. Insignificant decay, splitting, or crushing of timber members.

E. Minor scour exposing footing on solid rock with no undermining.

BRIDGE INSPECTION RATINGS
SUBSTRUCTURE, ITEM NO. 60 (Continued)

Rating 6: Satisfactory Condition. *Potential exists for major maintenance.*

A. Cracking, moderate to heavy scaling, deterioration or initial disintegration, minor water saturation, or cracking with leaching on concrete or masonry unit.

B. Spalls on concrete or masonry unit with no affect on the bearing.

C. Decay, cracking, splitting of timber members.

D. Highest rating for timber pile bents in which all timber piling have been replaced with H-pile from ground up in any one bent.

E. Minor or isolated exposure of piling on pile cap bents as a result of erosion with no reduction in capacity.

F. Minor undermining of substructure footing on rock.

G. Exposure of pile footings with no undermining.

H. Initial deterioration or pitting of structural steel piling that has little or no impact on structure.

I. Riveted seams on steel tubes (caissons) are bulging.

Rating 5: Fair Condition. *Potential exists for minor rehabilitation.*
No reduction in capacity.

A. Moderate or open cracking or heavy leaching of concrete units.

B. Major deterioration or disintegration of concrete or masonry units.

C. Spalls on concrete or masonry unit with a minor affect on the bearing area.

D. Timber pile substructure where any, but not all timber pile have been replaced with H-piles.

E. Significant decay, cracking, splitting, or crushing of timber members, requiring replacements.

F. Considerable additional exposure of piling on pile cap bents as a result of erosion, but still with no reduction in capacity.

G. Undermining of pile footings not affecting stability but requiring corrective action to protect exposed pilings from effects of additional erosion and corrosion.

H. Initial loss of steel structural members in critical stress areas.

I. Seam of steel tube opened slightly.

BRIDGE INSPECTION RATINGS
SUBSTRUCTURE, ITEM NO. 60 (Continued)

Rating 4: Poor Condition. *Potential exists for major rehabilitation.*
Some affect on load capacity. Blocking or shoring may be required as precautionary measure.

A. Any condition in Rating 5 that is excessive in scope.

B. Excessive cracking and leaching of concrete unit affecting load capacity.

C. Advanced section loss in primary reinforcing steel in concrete or masonry units.

D. Bridge may warrant lane reductions or load restrictions.

E. Substantial decay, cracking, splitting, or crushing of timber members, requiring high priority for replacement.

F. Timber pile substructure with approximately 25% of piling requiring replacement from ground up in any one bent.

G. Considerable additional exposure of piling on pile cap bents as a result of erosion, with minor reduction in capacity.

H. Scour critical bridge with actual scour limits within spread footings or piles, but structure is still in a stable state.

I. Advanced section loss or steel members in critical stress areas with reduction in capacity.

J. Seam on steel tube is split open. The material in the tube is deteriorating and/or cracking.

Rating 3: Serious Condition. *Repair or rehabilitation required immediately.*
Capacity of substructure reduced. May require blocking, shoring or load restrictions to remain in service.

A. Any condition described in Rating 4 that is of a severe magnitude or for which blocking or shoring is necessary (not precautionary).

B. Local failures are possible.

C. Lane reductions or load restrictions necessary.

D. Severe section loss in critical areas.

E. Timber pile substructure with approximately 50% of piling requiring replacement from ground up in any one bent.

F. Extensive exposure of piling on pile cap bents as a result of erosion significantly reducing capacity and affecting the stability of the unit.

BRIDGE INSPECTION RATINGS
SUBSTRUCTURE, ITEM NO. 60 (Continued)

G. Scour critical bridge with actual scour within limits of spread footings or piles and affecting the stability of the unit.

H. Cracking in tension zones of fracture critical steel members.

I. Significant shear cracking in concrete supports.

J. Seam on steel tube is split open. The material in the tube is disintegrating, sheared, or loose.

Rating 2: Critical Condition. CRITICAL INSPECTION FINDING. *The need for repair or rehabilitation is urgent. Facility should be closed until the indicated repair is complete.*

Follow procedures outlined in CRITICAL INSPECTION FINDINGS in this section.

A. On the verge of collapse and beyond the capabilities of blocking and shoring.

B. Scour critical bridge with scour below spread footing base or that exposes an excessive length of piling. Unit is unstable.

C. Severe shear cracking in concrete supports.

Rating 1: "Imminent" Failure Condition – facility is closed. CRITICAL INSPECTIION FINDING. *Study should determine the feasibility for repair. Corrective action may put structure back into service.*

Follow procedures outlined in CRITICAL INSPECTION FINDINGS in this section.

A. Scour critical bridge in which failure deemed imminent.

Rating 0: Failed Condition – facility is closed and is beyond repair. *Replacement of structure is necessary.*

Rating N: Not Applicable. *Use for culverts.*

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 61 (CONDITION)

BANK AND CHANNEL CONDITION

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

Rating 9: Excellent Condition.

A. No noticeable or noteworthy deficiencies that affect the condition of channel.

B. May be applicable for lined or paved channels.

Rating 8: Very Good Condition. *Potential exists for minor preventive maintenance.*

A. Channel alignment is good and stream is relatively stable.

B. Bank and channel are relatively free of brush and drift. No flow restriction under bridge.

C. Banks protected or well vegetated.

Rating 7: Good Condition. *Potential exists for minor maintenance.*

A. Minor amounts of drift and brush in channel or on banks that does not restrict flow.

B. Minor damage to bank protection (rip rap, grouted rock, etc.) or channel control devices (deflectors, dikes, etc.)

C. Minor channel scour.

Rating 6: Satisfactory Condition. *Potential exists for major maintenance.*

A. Minor eroding of stream bank. Minor channel movement is evident.

B. Minor damage over a wide area to channel control devices or bank protection.

C. Debris slightly restricting flow.

D. Bank is sloughing.

E. Minor scour at culvert toewall.

F. Minor eroding around wingwall or culvert.

BRIDGE INSPECTION RATINGS
BANK AND CHANNEL, ITEM NO. 61 (Continued)

Rating 5: Fair Condition. *Potential exists for minor rehabilitation.*

A. Bank protection is being eroded.

B. Major damage to embankment or channel control devices.

C. Drift, trees, or brush habitually restricting flow.

D. Deep channel scour.

E. Poor channel alignment.

F. Local scour at piers.

G. Scour at culvert toewall with no undermining.

H. Scouring behind wingwall of culvert.

Rating 4: Poor Condition. *Potential exists for major rehabilitation.*

A. Significant channel work required, such as deflectors, dikes, or channel straightening, to protect bridge and/or roadway.

B. Bank and channel protection is severely undermined.

C. Severe damage to channel control devices.

D. Large amounts of drift and debris in waterway blocking channel.

F. Extensive scour leading to undermining of footings or culvert toewalls.

G. Excessive scour behind culvert wingwall.

Rating 3: Serious Condition. *Repair or rehabilitation required immediately.*

A. Bank protection destroyed.

B. Channel control devices destroyed and stream threatening bridge.

C. Major streambed movement, resulting in waterway threatening bridge or approach roadway.

D. Any condition that, if left unchecked, may result in major structural damage to the bridge and/or roadway fill.

BRIDGE INSPECTION RATINGS
BANK AND CHANNEL, ITEM NO. 61 (Continued)

Rating 2: Critical Condition. CRITICAL INSPECTION FINDINGS. The need for repair or rehabilitation is urgent. *The waterway has changed to an extent that the bridge is near a state of collapse.*

Follow procedures outlined in CRITICAL INSPECTION FINDINGS in this section.

Rating 1: "Imminent" Failure Condition – facility is closed. CRITICAL INSPECTION FINDING. *Corrective action may put bridge back into service.*

Follow procedures outlined in CRITICAL INSPECTION FINDINGS in this section.

Rating 0: Failed Condition – facility closed. *Replacement of bridge is necessary.*

Rating N: Not applicable. *Use when bridge is not over a waterway.*

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 62 (CONDITION)

CULVERTS

GENERAL

The rating number for CULVERTS will be dictated by the alignment of the structure, settlement, or stability problems, the structural condition, or scour. This rating is intended to be an overall condition evaluation of a culvert.

Qualifying culverts may include multiple concrete or steel pipes as well as single or multiple barrel box culverts.

Condition Ratings-Item 58 (Deck), Item 59 (Superstructure), and Item 60 (Substructure) are coded N for culverts and therefore, do not have a direct bearing on this rating. Comments concerning the top slab may be placed in the DECK or SUPERSTRUCTURE section of inspection reports. The walls, bottom slab, and wingwalls will be considered as the SUBSTRUCTURE.

The pipe in multiple pipe culverts is considered as SUPERSTRUCTURE, with the bedding and outfall aprons classified as SUBSTRUCTURE.

Comprehensive rehabilitation of a culvert will normally restore the structure to a rating of 7 or possibly an 8.

If the structure is not a culvert, Code N.

Rating 9: Excellent Condition.

A. No deficiencies noted.

Rating 8: Very Good Condition. *Potential exists for minor preventive maintenance.*

A. No noticeable or noteworthy deficiencies that affect the condition of the culvert.

B. Insignificant scrape marks caused by drift.

Rating 7: Good Condition. *Potential exists for minor maintenance.*

A. Shrinkage cracks.

B. Light scaling.

C. Insignificant spalling or popouts with no exposed rebar.

D. Minor drift or collision damage.

E. Minor scouring at footings, toewalls, wingwalls, or pipes.

F. Superficial corrosion to metal culverts. Culvert still maintaining smooth symmetrical curvature.

BRIDGE INSPECTION RATINGS
CULVERTS, ITEM NO. 62 (Continued)

Rating 6: Satisfactory Condition. *Potential exists for major maintenance.*

A. Minor deterioration, light to moderate scaling, open cracks, cracking with some leaching, minor saturation.

B. Minor spalling of concrete.

C. Local scouring at footings, toewalls, wingwalls, or pipes.

D. Significant corrosion or moderate pitting of metal culverts. Culvert will still have smooth curvature but is non-symmetric in shape.

Rating 5: Fair Condition. *Potential exists for minor rehabilitation.*
No reduction in structural capacity.

A. Moderate deterioration or initial disintegration, moderate to heavy scaling, extensive cracking and leaching.

B. Spalling of concrete.

C. Minor settlement or misalignment.

D. Moderate scour or erosion along footings, toewalls, wingwalls, or pipes with slight undermining.

E. Significant distortion or deflection of metal culverts. Deep pitting or heavy corrosion of metal culverts with some small holes through flowline or small perforations throughout. Joints may be separating with minor loss of fill material.

Rating 4: Poor Condition. *Potential exists for major rehabilitation.*

A. Heavy to severe scaling, wide cracking, considerable leaching, major deterioration or disintegration.

B. Large areas of concrete spalling.

C. Considerable settlement and misalignment.

D. Open construction joint permitting loss of backfill.

E. Considerable scouring or erosion along footings, toewalls, wingwalls, or pipes with noticeable undermining.

F. Metal culverts have several sections of significant distortion and deflection. Extensive corrosion or deep pitting. May have large or many holes through flowline with loss of bed material possible or evident. Joints may be separated with loss of fill material through joints.

BRIDGE INSPECTION RATINGS
CULVERTS, ITEM NO. 62 (Continued)

Rating 3: Serious Condition. *Repair or rehabilitation required immediately.*

A. Any condition described in Rating 4, but which is severe or excessive in scope or that requires blocking or shoring.

B. Disintegration or distress to an extent that may result in holes through walls or slabs.

C. Detachment of wingwalls from culvert barrel.

D. Severe movement or differential settlement of segments or loss or fill.

E. Severe scour or erosion along footings, wingwalls, curtain walls, or pipes.

F. Extreme distortion and deflection in one section of metal culvert. Joints separated with advanced loss of fill material evident. Advanced section loss. May have invert rusted out or have extensive loss of bed material under flowline of culvert.

G. May warrant traffic reduction to one lane or load restrictions.

Rating 2: Critical Condition. CRITICAL INSPECTION FINDING. *Repair or rehabilitation is urgent. Facility should be closed until corrective action is taken.*

Follow procedures outlined in CRITICAL INSPECTION FINDINGS in this section.

A. On the verge of collapse or section has failed.

B. Integral wingwalls collapsed.

C. Severe roadway settlement due to loss of fill.

D. Complete undermining of culvert.

E. Extreme distortion and deflection throughout metal culvert. Joints separated with extensive loss of fill material.

Rating 1: "Imminent" Failure Condition – facility is closed. CRITICAL INSPECTION FINDING. *Study should determine the feasibility of repair. Corrective action may put structure back in light service.*

Follow procedures outlined in CRITICAL INSPECTION FINDINGS in this section.

BRIDGE INSPECTION RATINGS
CULVERTS, ITEM NO. 62 (Continued)

Rating 0: Failed Condition – facility is closed and beyond repair.

Rating N: Not applicable – use for structure not classified as culvert.

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 67 (APPRAISAL)

STRUCTURAL EVALUATION

Rating No. 67 will not be rated any higher than the lowest rating number assigned to Item 59 (Superstructure), 60 (Substructure), or Table 1 (which evaluates inventory load rating for various traffic volumes). For culverts, the lower rating for Item 62 and Table 1 should generally be used.

The inspector should consider the general condition of the structure in arriving at the STRUCTURAL EVALUATION rating with particular attention given when arriving at a rating of 2 or 3.

It should be noted that the STRUCTURAL EVALUATION rating may or may not be indicative of the general overall condition of the bridge.

Rating	Remarks
9	Superior to present desirable criteria.
8	Equal to present desirable criteria.
7	Better than present minimum criteria.
6	Equal to present minimum criteria.
5	Somewhat better than minimum adequacy to tolerate being left in place as is.
4	Meets minimum tolerable limits to be left in place as is.
3	Basically intolerable requiring high priority for corrective action.
2	Basically intolerable requiring high priority of replacement.
1	This value for rating code not used.
0	Bridge closed.
Note:	For Off-System inspections, this will be coded by MAIN OFFICE PERSONNEL.

TABLE 1. Rating by Comparison of ADT - Item 29 and Inventory Rating - Item 66.

STRUCTURAL EVALUATION RATING CODE	INVENTORY RATING		
	AVERAGE DAILY TRAFFIC (ADT)		
	0-500	501-5,000	>5,000
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.		
1	Bridge closed.		

* Code HS rating load (typical)
** HS Designation (typical)

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 68 (APPRAISAL)

DECK GEOMETRY

The overall rating for deck geometry will be the lower of the rating codes obtained from Tables 2A through 2D and Table 2E where applicable.

Note: For Off-System inspections, this item will be coded by MAIN OFFICE PERSONNEL.

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

DECK GEOMETRY RATING CODE	TABLE 2A: Bridge Roadway Width 2 Lanes; 2-Way Traffic — ADT (Both Directions)						TABLE 2B: Bridge Roadway Width 1 Lane; 2-Way Traffic — ADT (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.							

* Use value in parenthesis for bridges longer than 200 feet.

Notes:

1. Use the lower rating code for values between those listed in the table.
2. Dimensions are in feet.
3. For 3 or more undivided lanes of 2-way traffic, use Table 2C, "Other Multilane Divided Facilities".
4. Do not use Table 2B for code 9 and for codes 8 through 4 inclusive then the ADT >100. 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 ADT of 100.

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

DECK GEOMETRY RATING CODE	TABLE 2C				TABLE 2D	
	Bridge Roadway Width 2 or More Lanes Each Direction				Bridge Roadway Width 1-Way Traffic	
	Interstate and Other Divided Freeways		Other Multilane Divided Facilities		Ramps Only	
	2 Lanes	3 or More Lanes	2 Lanes	3 or More Lanes	1 Lane	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.					

* Use value in parenthesis for bridges longer than 200 feet.
N= Number of lanes of traffic in direction traveled.

Notes:

1. Use the lower rating code for values between those listed in the table.

2. Dimensions are in feet.

3. Use Table 2C, "Other Multilane Divided Facilities", for 3 or more undivided lanes of 2-way traffic.

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

DECK GEOMETRY RATING CODE	Minimum Vertical Clearance			
	Functional Class			
	Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals
	All Routes - Except as Noted for Urban Areas	Undesignated Routes, Urban Areas*		
9	>17'- 0"	>16'- 6"	>16'- 6"	>16'- 6"
8	17'- 0"	16'- 6"	16'- 6"	16'- 6"
7	16'9"	15'- 6"	15'- 6"	15'- 6"
6	16'- 6"	14'- 6"	14'- 6"	14'- 6"
5	15'- 9"	14'- 3"	14'- 3"	14'- 3"
4	15'- 0"	14'- 0"	14'- 0"	14'-
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.			

* Use for routes in highly developed urban areas only when there is an alternative interstate, freeway, or expressway facility with a minimum of 16'- 0" clearance.

Notes:

Use the lower rating code for values between those listed in the table.

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 69 (APPRAISAL)

VERTICAL AND HORIZONTAL UNDERCLEARANCE

The rating for vertical and horizontal underclearance will be the lower of the codes obtained from Tables 3A and 3B.

Note: For off-system inspections, this item will be coded by MAIN OFFICE PERSONNEL.

Table 3A. Rating by Comparison of Minimum Vertical Underclearance - Item 54 and Functional Classification of Underpassing Route.

UNDER-CLEARANCE RATING CODE	Minumum Vertical Underclearance				
	Functional Class				
	Interstate and Other Freeway		Other Principal and Minor Arterials	Major and Minor Collectors and Locals	Railroad
	All Routes - Except as Noted for Urban Areas	Undesignated Routes, Urban Areas*			
9	>17'- 0"	>16'- 6"	>16'- 6"	>16'- 6"	>23'- 0"
8	17'- 0"	16'- 6"	16'- 6"	16'- 6"	23'- 0"
7	16'9"	15'- 6"	15'- 6"	15'- 6"	22'- 6"
6	16'- 6"	14'- 6"	14'- 6"	14'- 6"	22'- 0"
5	15'- 9"	14'- 3"	14'- 3"	14'- 3"	21'- 0"
4	15'- 0"	14'- 0"	14'- 0"	14'- 0"	20'- 0"
3	Underclearance less than value in rating code of 4 and requiring corrective action.				
2	Underclearance less than value in rating code of 4 and requiring replacement.				
0	Bridge closed.				
N	Bridge does not cross over roadway or railroad.				

* Use for routes in highly developed urban areas only when there is an alternative interstate, freeway, or expressway facility with a minimum of 16'- 0" clearance.

Notes

1. Use the lower rating code for values between those listed in the tables.

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

BRIDGE INSPECTION RATINGS
VERTICAL AND HORIZONTAL UNDERCLEARANCE, ITEM NO. 69 (Continued)

Table 3B rating by Comparison of Minimum Lateral Underclearances Right & Left - Items 56 and Functional Classification of Underpassing Route.

UNDER-CLEARANCE RATING CODE	Minimum Vertical Underclearance						
	Functional Class						
	1-Way Traffic				2-Way Traffic		
	Principal Arterials - Interstate, Freeways, or Expressways				Other Principal and Minor Arterials	Major and Minor Collectors and Locals	Railroad
	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	Underclearance less than value in rating code of 4 and requiring corrective action.						
2	Underclearance less than value in rating code of 4 and requiring replacement.						
0	Bridge closed.						
N	Bridge does not cross over roadway or railroad.						

Notes

1. Use the lower rating code 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, use the value from the right ramp column to determine code.

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

BRIDGE INSPECTION RATINGS
DETERMINATION OF RATING, ITEM NO. 71 (APPRAISAL)

WATERWAY ADEQUACY

(Based on Functional Classification of the inventory route from NBI Item 26)

Rating 9: All Weather Crossing – Superior to present desirable criteria.

A. Bridge deck and roadway approaches above high water with only a remote chance of flooding.

Rating 8: All Weather Crossing – Equal to present desirable criteria.

A. Only a slight change of flooding roadway approaches. Bridge deck is above roadway approaches.

Rating 7: Stream Crossing – Better than present minimum criteria. This coding is strictly limited to inventory routes with a functional classification of 08, 09, 17 or 19.

A. Slight chance of flooding bridge deck and approaches.

Rating 6: Stream Crossing – Equal to present minimum criteria.

A. Functional classification of the inventory route is other than 08, 09, 17 or 19 – Slight chance of flooding bridge deck and approaches.

B. Functional classification is 08, 09, 17, or 19 – Occasional flooding of approaches resulting in minor traffic inconvenience. Bridge deck is above roadway approaches.

Rating 5: Stream Crossing – Somewhat better than minimum adequacy to tolerate being left in place as is.

A. Functional classification of the inventory route is 02, 06, 07, 14, or 16 – Occasional flooding of approaches resulting in minor traffic inconvenience. Bridge deck is above roadway approaches.

B. Functional classification is 08, 09, 17, or 19 – Bridge deck is above roadway approaches. Approaches flood occasionally, resulting in significant traffic delays.

C. This coding is not available for bridges on inventory routes with a functional classification of 01, 11, or 12.

Rating 4: Stream Crossing – Meets minimum tolerable limits to be left in place as is.

A. Functional Classification of inventory route is 01, 11 or 12 – Occasional flooding of approaches, resulting in insignificant traffic delays. Bridge deck is above roadway approaches.

B. Functional Classification of inventory route is 02, 06, 07, 14 or 16 – Occasional flooding of roadway approaches, resulting in significant traffic delays. Bridge deck is above roadway approaches.

C. Functional Classification of inventory route is 08, 09, 17 or 19 – Bridge deck and roadway approaches occasionally flood, resulting in significant traffic delays.

Rating 3: Basically intolerable requiring high priority for corrective action.

A. Inventory Routes with functional classification of 01, 11, or 12 – Occasional flooding of roadway approaches resulting in significant traffic delays. Bridge deck above roadway approaches.

B. Inventory Routes with functionally classification of 02, 06, 07, 14 or 16 – Bridge deck and roadway approaches flood occasionally, resulting in significant traffic delays.

C. Inventory Routes with functional classification of 08, 09, 17 or 19 – Bridge deck and roadway approaches are frequently flooded, resulting in significant traffic delays.

Rating 2: Basically intolerable requiring high priority for replacement.

A. Functional Classification of inventory route is 01, 11, or 12. Occasional or frequent overtopping of bridge deck and roadway approaches with either significant or severe delays.

B. Functional Classification of inventory route is 02, 06, 07, 14 or 16. Frequent overtopping of bridge deck with significant delays or occasional or frequent overtopping with severe delays.

C. Functional Classification of 08, 09, 17 or 19. Occasional or frequent overtopping of bridge deck and roadway with severe delays.

Rating 1: This value of rating code not used.

Rating 0: Bridge closed.

Rating N: Not applicable. Bridge not over water.

Definition of Terms:

Overtopping frequency information descriptions mean the following:

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

Adjectives describing traffic delays mean the following:

Insignificant	-	Minor inconvenience. Highway passable in a matter of hours.
Significant	-	Traffic delays up to several days.
Severe	-	Long term delays to traffic with resulting hardship. (Floods corresponding to overtopping frequency will result in weeks or months of delays.)

APPROACH ROADWAY ALIGNMENT

This item determines the adequacy of the approach roadway alignment as compared to the general alignment for the section of the route the bridge services. It is not intended that the approach roadway alignment be compared to current standards, but rather to the existing highway alignment.

The item indicates the differential safe operating speed of the general route and the safe operating speed of the approach roadway alignment.

For example, if the highway section requires substantial speed reduction due to the vertical or horizontal alignment, and the approach roadway alignment requires only a minor additional speed reduction at the bridge, the appropriate rating would be a 6.

Traffic flow at tee intersections near the bridges will determine how the tee intersection affects the approach roadway alignment rating. The following examples are provided for guidance. See figure 2.3.

Case 1. Traffic across the bridge must stop or yield to through traffic. Tee intersection part of basic roadway alignment does not lower rating. Additionally, if the roadway alignment requires lower operating speeds, this may raise the approach roadway alignment rating.

Case 2. Traffic across bridge is through traffic on relatively straight alignment. Tee intersection does not affect rating. Rate as if side road does not exist.

Case 3. Traffic across bridge is through traffic and turns nearly 90 degrees. Rate as if side road does not exist, i.e. rate alignment as if on a curve.

Each bridge will be rated in accordance with the following guidelines:

Rating	Remarks
8	Equal to present desirable criteria. *Equal to general roadway alignment conditions.*
	No reduction in the operating speed is required because of the horizontal or vertical curvature of the approach roadway. (Straight, level approach)
6	Equal to present minimum criteria. *Slightly less adequate than general roadway alignment.*
	A very minor reduction in the operating speed is required because of the horizontal or vertical curvature of the approach roadway.

Rating	Remarks
3	Basically intolerable requiring high priority of corrective action. *Substantially less adequate than general roadway alignment.*

A substantial reduction in the operating speed is required because of the horizontal or vertical curvature of the approach roadway. Substantial is defined as a reduction in speed down to 35% or less of the safe operating speed of the route in general. For non-state, off-system inspectors, code both the estimated safe operating speed and general operating speed of the approach roadway in the comment section of the inspection form.

Note: (Added 1/2000)

Additional codes should be selected between the above three general values if needed to better describe the approach roadway alignment. For example "4" could be used to convey a significant speed reduction is required which is not to the degree of the intolerable situation described above for a "3" rating. A "5" coding could be used to appropriately describe a situation where a "moderate" speed reduction over the safe operating speed of the route in general is required.

TRAFFIC SAFETY FEATURES

I. Background

In order to meet currently accepted traffic safety standards, an appropriate crash-tested bridge railing system is required along the edges of all structures.

Recent revisions to MoDOT's design policies (in the latter part of 1998) now require that bridge railings for structures located on the state system and non-state bridges located "on-federal" routes meet the latest FHWA Test Level 3 (TL-3) criteria of NCHRP Report 350.

In accordance with MoDOT's updated design policies, only non-state "off-federal" system bridges having certain conditions of low traffic and speed described later in this section can be permitted to meet current standards at the lower level (TL-2) requirements of NCHRP 350. This is an option available for these types of low traffic bridges to meet current standards in addition to the (TL-3) requirements normally required for state system structures. However, unless these special conditions of low traffic and reduced speed prevail at the site of a non-state "off-federal" system bridge, bridge railings are generally required to meet the more restrictive (TL-3) requirements to conform to currently accepted standards.

In addition to the railing along the edges of the bridge, traffic safety features will normally consist of a crash-worthy bridge anchor, transition section, and an end terminal section. In order to be considered to meet currently accepted standards for the state system and non-state "on-federal" system bridges, these features are required which meet the latest design standards published for state structures in accordance with (TL-3) level requirements.

However, for certain locations of non-state "off-federal" system structures meeting standards of low traffic volume and speed, the criteria for features located off the bridge has either been modified, or these types of features located off of the bridge structure are not considered to be required. (Features off the bridge which do not physically exist are coded as "not applicable" in these situations.)

II. Coding of Existing Traffic Feature

Traffic safety features located on and adjacent to the bridge structure are rated by a 4-digit code. Each digit of the code relates to a separate feature. The four features included in this rating are:

1. Bridge railing
2. Transitions from bridge railing to approach guardrail
3. Approach guardrail
4. Approach guardrail ends.

In evaluating each feature, the following codes are to be used. The coding will depend on the particular system the bridge is located on.

Rating 1: Acceptable - Inspected feature meets currently accepted standards.

Rating 0: Unacceptable - Inspected feature does not meet currently accepted standards.

Rating N: Not applicable or not required for the particular location.

For structures with two-way traffic, consider the railing at all four corners of the structure. A feature may occur several times at a bridge, but if one detail of a feature is unacceptable, the rating for that particular section of the coding should be "0". However, collision damage or deterioration of an element is not normally considered in the coding of this item and is usually reported by the inspector to the district or other entity having operational control, and noted in the comments section of the inspection forms.

For non-state structures the functional classification code (NBI Item 26) can normally be used to determine if the structure is located "on-federal" system or if it is an "off-federal system" bridge. "Off-federal" system bridges are coded with either an 08 (Rural Minor Collector), 09 (Rural Local), or 19 (Urban Local) in Item 26. For best results, these codings should be periodically reviewed at the district level for accuracy using urban boundary functional classification maps available from the district office or MoDOT's office of Planning.

III. General Notes and Requirements (State and Non-State)

The following are some general requirements for each of the four features which are common to both the state system and non-state system as applicable.

1. Bridge railing

A. Bridge railings on the bridge are considered to be a requirement on all structures. These railings are required to meet specific geometric criteria as well as meet the appropriate FHWA crash test criteria.

B. All applicable portions of the following geometric criteria must be met in addition to the crash test criteria for the installation to be considered acceptable. Note that some features may become unacceptable due to deck resurfacing.

1. Bridge rail shall provide a smooth, continuous face on the traffic side with posts set back from rail face.
2. The railing height shall not be less than 2'-3" from the top of reference surface (i.e., roadway, sidewalk, or curb exceeding 9 inches in width).
3. Spacing of top mounted steel posts shall not exceed 6'-3".
4. Spacing of concrete posts shall not exceed 10'-0".
5. Spacing of side mounted steel posts for SL-1 bridge railings shall not exceed 8'-4" and shall be attached to the slab only. (This applies only to the SL-1 railing which is only considered acceptable for certain low traffic non-state bridges.)

C. Culverts:

1. When bridge railing is required for box culverts due to geometric requirements (See D.1. below), a standard shoulder width roadway "W" type guardrail continued across the culvert is coded as a "1" (acceptable), provided there is sufficient fill above the box to support the railing; otherwise, one of the appropriate crash tested railing systems appropriate for the type of system where the bridge is located is required.

D. Exceptions (Code as N)

1. Bridge railing systems are not required for culverts when the headwalls are located outside the "clear zone." The clear zone is a variable of speed, functional classification, and ADT. The clear zone concept and suggested clear zone dimensions are presented in the AASHTO publication, "Roadside Design Guide." However, object markers are suggested as good practice in these instances.

(a) For culverts located on local off-federal system roads with an ADT <= 100 and normal route driving speed less than 30 mph, the clear zone can be considered to extend to 7 feet from the edge of an imaginary 12-foot single center driving lane over the culvert.

2. Transitions from bridge railing to approach guardrail

A. Transition railing meeting (TL-3) criteria are required on all state system structures. They are also required for non-state system bridges located on routes designated "on-federal" and for "off-federal" system bridges that do not meet certain low traffic and speed criteria.

B. To be considered acceptable, all applicable portions of the following minimum geometric requirements must be met when transitions are required for the particular system the bridge is located on.

1. Firmly attached to bridge end.
2. Approach railing gradually stiffened as it comes closer to the bridge rail.

3. Approach guardrail

A. Approach guardrail meeting (TL-3) criteria is required on all state system structures. It is also required for non-state system bridges located on routes designated "on-federal" and for "off-federal" system bridges not meeting certain criteria of low traffic and speed.

B. To be considered acceptable, all of the following minimum geometric requirements must be met when approach guardrail is required for the particular system where the bridge is located.

1. Capable of safely redirecting an impacting vehicle.
2. Provide transition to bridge railing which will not cause snagging or pocketing from an impacting vehicle.
3. Shoulder slope to extend a minimum of 2 feet beyond rail post before starting fill slope.
4. Approach guardrail posts shall not be spaced more than 6'-3" apart.

4. Approach guardrail ends (Terminal Section)

A. Approach guardrail ends meeting (TL-3) criteria are required on all state system structures. They are also required on non-state system bridges located on routes designated "on-federal" and for "off-federal" system bridges not meeting certain criteria of low traffic and speed.

B. To be considered acceptable, the following geometric criteria must be met when approach guardrail is required for the particular system where the bridge is located.

1. Terminal sections should be buried, flared, made breakaway, or shielded, as applicable to the system where the route is located.

IV. Specific System-based Coding Guidelines

1. State System Structures

A. For all structures on the state system, all four separate features (bridge railing, transitions, approach guardrail, and guardrail ends) are required to be in place in accordance with (TL-3) criteria, unless other design considerations would preclude their use.

B. For all structures on the state system, all four digits for each feature included in Item No. 36 should be evaluated based on the latest revisions to MoDOT's standard design drawing for the particular feature being evaluated. If a conflict exists between the general requirements described herein and an essential feature required by the standard drawings for (TL-3) criteria, the standards will generally govern unless an exception is indicated.

C. Acceptable bridge railings meeting (TL-3) criteria are generally limited to either a MoDOT Standard New Jersey barrier or thrie beam system that conforms to current MoDOT standard plans.

D. Allowable exceptions to features located off the bridge for streets located in urban areas with speed restrictions <= 50 mph, the transition section may be provided by a concrete transition section having a gradual taper of suitable length from a concrete bridge barrier rail to the city standard curb and gutter section (Code as "N").

2. Non-state structures located "on-federal" system and "off-federal" system structures not meeting the low traffic and reduced speed criteria of paragraph 3. below.

A. For bridges located on these "on-federal" system non-state routes, requirements and coding of all features is the same as for state system structures described in paragraph 1. above.

3. Non-state structures located on routes designed "off-federal" system with an ADT <= 400 and a normal route driving speed of <= 50 mph.

A. Acceptable off-system Bridge Railings (code as "1")

Acceptable alternative types of bridge railings known to be available to generally meet the reduced (TL-2) requirements. (See Figures 2.4 through 2.7 for illustrations of typical bridge railing systems considered acceptable on the off-system.)

1. Standard Concrete New Jersey type barrier with sloped face.
2. Standard 12 gauge thrie beam rail with W6x20 steel posts mounted top of slab with a C8x11.5 channel attached to the top of posts.
3. Kansas standard concrete corral rail and concrete posts. (Figure 2.5.)
4. Service Level 1 (SL-1) type crash-tested thrie beam rail with side mounted TS 6x3 posts. Since SL-1 railings are a "flexible" system, in order to function properly SL-1 railings need to have acceptable anchorage located off the bridge in order to be considered acceptable on the bridge to code as a "1." If these essential features off the bridge are nonexistent, code the first digit of Item No. 36 a "0," as the installation is not considered to be crashworthy according to (TL-2) requirements. (For SL-1 type railings, features off the bridge also need to be coded in accordance with the following sections.) Acceptable bridge railing options for a complete (TL-2) system are as follows.

   (a) An SL-1 bridge rail with a transition section and a flared BCT end terminal anchor. Code Item 36 as "1-1-N-1."
   (b) MoDOT modified SL-1 standard rail with a transition section and roll down terminal section. Code Item 36 as "1-1-N-1." (See Figure 2.6.)

(c) SL-1 railing with a BCT terminal section at the end of the bridge. Code as "1-N-N-1." (See Figure 2.7.)

5. Concrete curb and parapet, provided the curb has a vertical height of 9 inches maximum and a set-back to the parapet of 3 inches maximum.

6. Illinois standard WT bridge rail, which is similar to the Ohio box beam rail.

B. Features off the bridge (last 3 digits of Item 36).

In general for "off-federal" system structures with ADT <= 400 and the normal driving speed on the route <= 50 mph, safety features off the bridge are not normally considered to be required (code last 3 digits of Item 36 as "N").

However, where features have been installed off the bridge to provide protection from high fills or steep slopes, these features are generally rated for the purposes of NBI Item 36. The following examples are intended to provide guidance to the off-system bridge inspector for those features that can be considered to substantially meet reduced criteria for low traffic bridges for coding Item 36.

1. Acceptable low traffic transition rails (code second digit as a "1").

   (a) Two nested 12 gauge thrie beam with a transition section from a thrie beam bridge rail to a standard "W" approach railing.
   (b) Two nested 10 gauge standard "W" beam rails above a single 10 gauge "W" beam rail.
   (c) Suitable length gradual concrete transition section to the normal city street curb section.
   (d) Transition section from thrie beam to standard "W" beam (SL-1 only).
   (e) Features meeting current MoDOT standard drawings.

2. Acceptable low traffic approach guardrail (code third digit as a "1").

   (a) Standard "W" shape approacn rail with W6x8.5 steel or 8"x8" wood posts and block-outs. (Post spacing cannot exceed 6'-3").
   (b) MoDOT standard concrete barrier with sloped face.
   (c) Concrete curb and parapet.
   (d) Safety features that meet current MoDOT standard drawings.

3. Acceptable low-traffic bridge terminal ends (code last digit as a "1").

   (a) Slotted Rail Terminal (SRT) and the ET2000.
   (b) Standard turned down section and standard BCT terminal section.

C. Non-State "off-federal" system (low traffic) coding examples.

1. The following examples are intended to assist the off-system inspector on the proper coding of Item 36 for routine situations. All examples are for an "off-federal" route with ADT <= 400 and normal route driving speed <= 50 mph. Examples also assume existing off the bridge features are present at all four corners of the bridges with two-way traffic.

   (a) Guardrail on bridge does not meet one of the listed options for an acceptable (TL-2) rail described in 3.(A.) above, and no safety features exist off the bridge. Code: "0-N-N-N."
   (b) Rail on bridge meets the description of an acceptable (TL-2) rail, and no other safety features exist off the bridge. Code: "1-N-N-N."
   (c) Rail on bridge meets the description of an acceptable (TL-2) rail, and safety features also exist off the bridge. Code first digit of Item 36 = "1," then rate the existing installation for the last 3 digits according to 3.(B.) above.
   (d) An (SL-1) type railing is encountered. See 3.(A.)4. above for coding examples.
   (e) Bridge has acceptable concrete Jersey type rail with appropriate concrete transition section to the normal city street curb and gutter section. Street posted speed limit is 45 mph. Code: "1-1-N-N."
   (f) Concrete culvert with sufficient fill and headwalls inside clear zone. Existing protection is standard roadway "W" guardrail which is continued through the structure from a normal roadway shoulder installation. Ends of existing guardrail have standard turned down terminal section. Code: "1-N-1-1."
   (g) Standard Jersey type barrier on the bridge. Existing off the bridge features include a standard "W" type approach guardrail attached directly to Jersey barrier with turned down terminal section. Since no acceptable transition section exists, Code: "1-0-1-1."

BRIDGE INVENTORY INSPECTIONS
DETERMINATION OF ITEM NO. 106 (Reconstruction Date)

I. General

The following information is being presented as an aid to non-state bridge inspectors and other office personnel that may be involved in preparing SI&A information for new or revised structures.

A reconstruction date needs to be coded in Item 106 when the scope of work to an existing bridge clearly involves a major reconstruction effort. This is generally understood to be if the rehabilitation work to remove deficiencies involves substantial changes to the physical geometry or form of the existing structure, or if the work was a significant effort which was intended to result in a substantial increase to the structure's overall load capacity. When reconstruction work has been observed, Item 106 is coded with a date regardless of the source of funds used to do the work (local or federal). An additional "1" suffix is normally added to the eighth digit of the non-state bridge number when the work involves major reconstruction.

District personnel need to use care in coding this item since a date in this data field will cause the bridge to be ineligible for federal funding for a 10-year period under the FHWA "10-year rule."

In any of the district's ongoing dialogue with local bridge owners, it is recommended that an effort should be made to inform local agencies that work which falls into the classification of major reconstruction has an effect on the county's BRO apportionment and the near-future funding eligibility of the bridge involved. The 10-year rule applies even if local funds are used to do the work, or if the structure would become closed or otherwise deficient within this period of time. Therefore, local bridge owners need to be aware of the implications of NBI Item 106 when developing or planning strategies for rehabilitation work on a particular bridge.

Ordinary Repairs or maintenance work does not cause Item 106 to be coded with a date, or cause an additional "1" suffix to be added to the eighth digit of the bridge number.

If an old bridge is replaced with an entirely new bridge, Item 106 is not coded with a date, but the SI&A should instead indicate in the "date built" field the construction date for the replacement structure. In this instance, Item 106 is coded "0000."

II. Examples of Some Items not Considered to be Major Reconstruction

A. Guardrail replacement or upgrading. (Modest increases in load capacity may result due to dead load difference.)

B. Painting of structural steel.

C. Utility work.

D. Overlays of a bridge deck carried across as part of a road resurfacing project.

E. Emergency repairs to restore structural integrity following an accident.

F. Replacement in-kind of structural members, or bridge decking with a similar type of material or system.

G. Replacement of a substructure element, or adding an adjacent "helper" to a failing substructure or superstructure element.

H. Addition of a jumper span to an existing bridge as a result of the roadway approach becoming eroded due to scour. This can also include situations where an existing end span is lengthened due to scour. This is provided the following conditions are met:

(1) The work should not otherwise involve substantial changes to the former structure's type, geometry, or the overall load capacity of the bridge does not substantially increase as a result.

I. Normal increases in load capacity of existing structural members which are merely a by-product of the addition of lateral bracing to the main load-carrying members.

J. Seismic retrofits.

K. Ordinary repairs.

III. Some Examples of Reconstruction Work (Code 106 with a date)

A. Replacement of the bridge's superstructure on the old piers.

B. A change in the type of form of the structure. For example, replacing steel girders with prestressed concrete members.

C. Strengthening projects which are intended to substantially increase the load capacity of an existing bridge by strengthening or replacing the existing main components of a bridge.

D. Extensive renovation work on a closed bridge to remove deficiencies and increase load capacity to enable it to be reopened to traffic (other than ordinary repairs or other exceptions discussed above)

E. Bridge widening to remove a deficiency in width (NBI Item 68).

IV. Other Comments

A. If districts are aware of temporary or emergency repair situations, Item 106 should not normally be coded but an appropriate explanation should be forwarded to the Bridge Division along with the revised SI&A.

B. The above examples are not all-inclusive, and the main office should be contacted in the event questions should arise concerning the proper coding of Item 106.

BRIDGE INSPECTION RATINGS
DETERMINATION OF ITEM 108A
WEARING SURFACE/PROTECTION SYSTEMS
(NON-STATE BRIDGES)

I. General

The following criteria was provided to the districts by a letter dated April 8, 1996, which was to be used to code Item 108A on all future submittals. To assist non-state bridge personnel in the proper coding of this item, it is being included in the Bridge Inspection Manual.

If district inspectors observe an incorrect coding for Item 108A in BOSI, please make a note for the Bridge Division to correct it in the BOSI comment section.

II. Coding Guide

Code	Description
1	Monolithic Concrete (concurrently placed with structural deck). This item should be coded when the cover over the top reinforcement in a deck exceeds 2" for bars with corrosion protection and 2½" without corrosion protection. When the depth of cover over the top reinforcement is not known, it should be coded "0".
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 with the bridge deck. The concrete cover for top reinforcing bars is less than 2" for bars with corrosion protection, less than 2½" of cover for bars without corrosion protection, or the depth of cover over the top bars is unknown.)
N	(Not applicable - applies to structures with no deck.)

III. Comments

For new bridges constructed with federal funds the code for this item should not be "0." Normally. the coding should be "1" for monolithic concrete decks.

MISSOURI HIGHWAY AND TRANSPORTATION DEPARTMENT
CRITICAL INSPECTION FINDING
STATE SYSTEM

Bridge _____ District _____ County _____

Route _____ Location _____

Inspector(s) _____ Inspection Date ___-___-___

Reason for Critical Inspection Report:

Inspector's Immediate Recommendations:

MHTD Action Plan:

Follow-Up Actions: Completion Date ___-___-___

Figure 2.1

NON-STATE SYSTEM BRIDGE INSPECTION PROGRAM
CRITICAL INSPECTION FINDING

SECTION 1

Bridge No. _____ **County** _____ **Route** _____

Bridge Owner _____ Feature Intersected _____

Location: Sec____ T____ R____

Inspection Date _____ **(NOTE:** Notify District Office Immediately) Date District Office Notified _____

SECTION 2

Reason for Critical Inspection Report: _____

_____

_____

Inspector's Recommendation to Bridge Owner: _____

_____

_____

SECTION 3

District Recommendation to Bridge Owner: _____

_____

_____

District Action Required	**Date** (Mo./Day/Yr.)	**Requirement**
Initial Verbal Contact of Owner (Person Contacted _____)	_____	Immediately
First Follow-Up Letter with CIF Report	_____	Within 7 Days
Copy of CIF and Inspection Report to Bridge Division	_____	Within 7 Days
District Field Check	_____	Upon notification by county
Submit to Bridge Office*	_____	Within 30 Days

* Include CIF report, complete to date, copy of biennial inspection report, photos of repair or closure, and copy of all correspondence with bridge owner, to date. When the CIF is resolved or on the last submission, attach an 8½" x 11" copy of a portion of the map showing the location of the bridge.

SECTION 4

Bridge Division Action Required

Date Reviewed	_____	As soon as possible
Final Review and Submission to FHWA	_____	As soon as possible

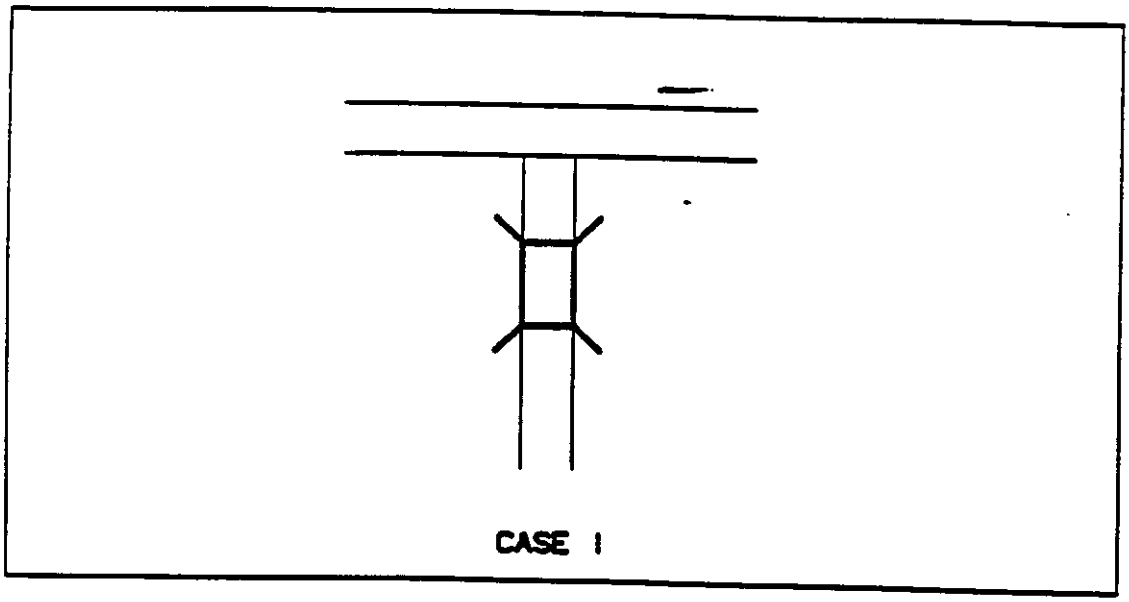
Summary of Bridge Owner Response: _____

_____

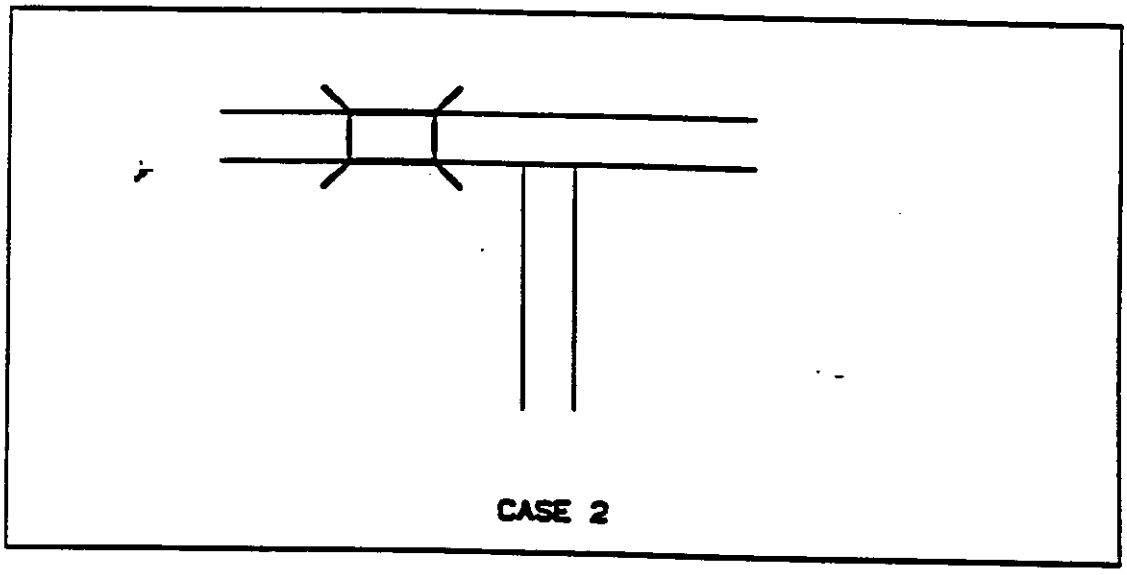
_____

Figure 2.2

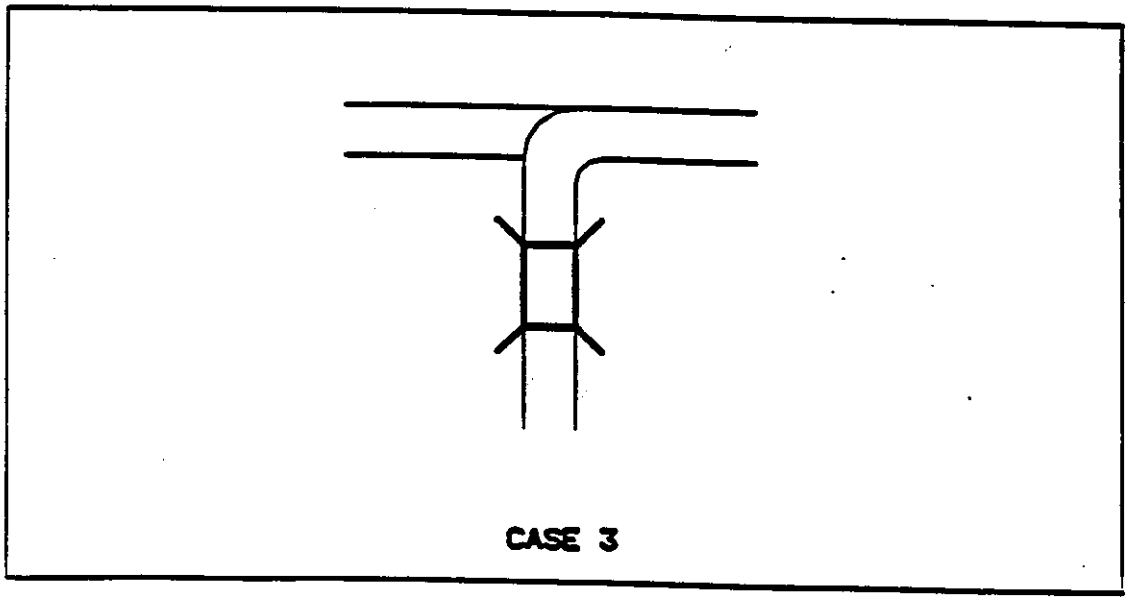
APPROACH ROADWAY ALIGNMENT
TEE INTERSECTIONS



CASE 1



CASE 2



CASE 3

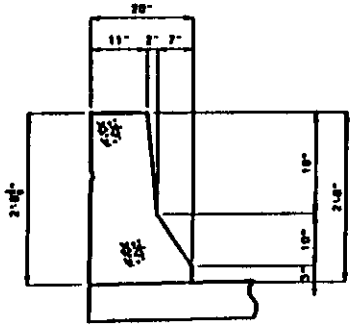
FIGURE 2.3

REV. 10/94

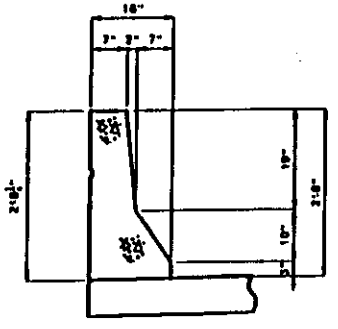
FIGURE 2.4

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

STATE MO | PROJ. NO | SHEET NO

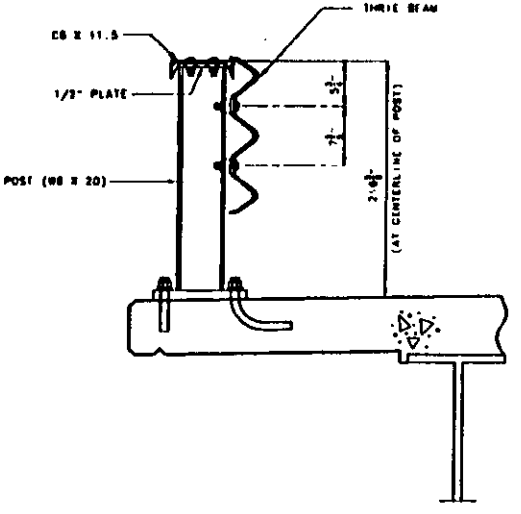


20" SAFETY BARRIER CURB



18" SAFETY BARRIER CURB

NEW JERSEY BARRIER



THIS RAIL IS DISTINGUISHED BY THE CHANNEL AT THE TOP OF THE RAIL AND A 6'3" POST SPACING ON THE BRIDGE AND THE THRIE BEAM RAIL.

TYP. PART SECTION OF THRIE BEAM RAIL POST

NOTE:

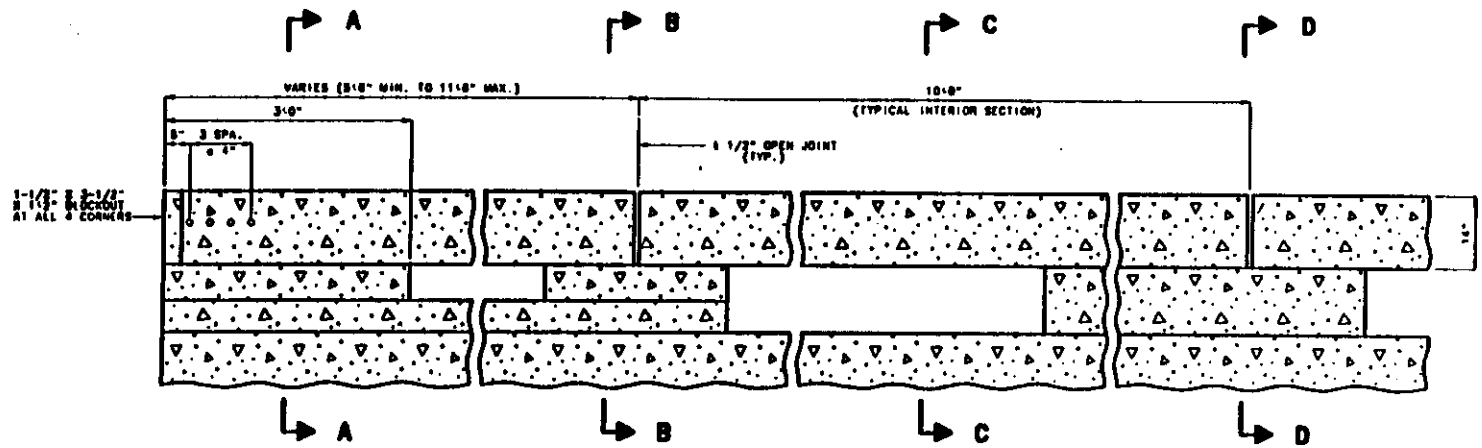
THE APPROVED APPROACH GUARD RAIL AND TRANSITION SECTION REQUIRE TWO NESTED SECTIONS OF GUARD RAIL AS WELL AS A 3'11-1/2" POST SPACING. THE TERMINAL SECTION MAY BE A BREAKAWAY CABLE TYPE OR A TURNED DOWN TYPE. THESE REQUIREMENTS ARE APPLICABLE FOR ALL RAILS EXCEPT THE SL-1.

DETAILED OCT. 1993 | NOTE: THIS DRAWING IS NOT TO SCALE. FOLLOW DIMENSIONS. | SHEET NO. 1 OF 3 | APPROVED BRIDGE RAILS

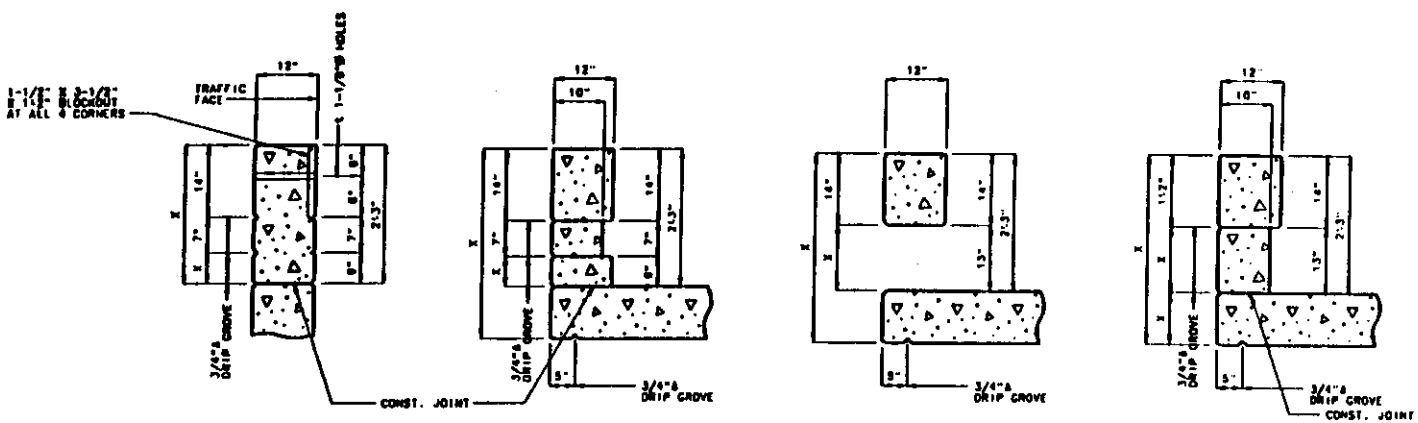
REV. 10/94

FIGURE 2.5

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION



TYPICAL ELEVATION



TYP. END POST SECTION A-A

TYP. CURB SECT. SECTION B-B

TYP. SECTION BETWEEN POST & CURB SECTION C-C

TYP. INTERIOR POST SECTION D-D

X = THESE DIMENSIONS VARY DUE TO SLOPE OF DECK AND THICKNESS OF SLAB

KANSAS CORRAL RAIL

DETAILED BY [illegible]

NOTE: THIS DRAWING IS NOT TO SCALE. FOLLOW DIMENSIONS.

SHEET NO. 3 OF 3

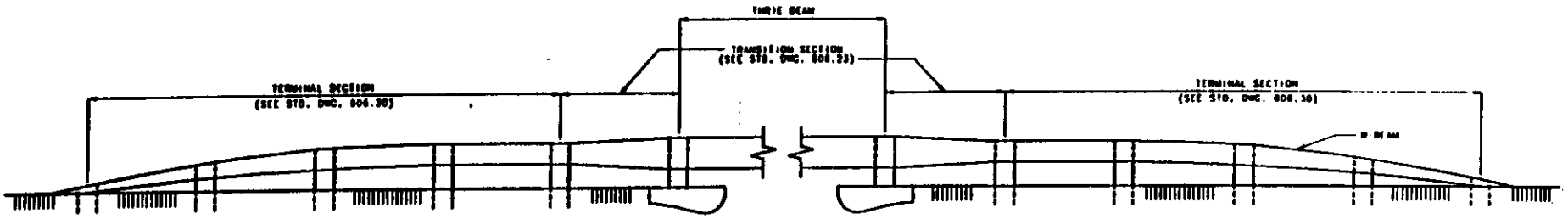
APPROVED BY [illegible] RAILS

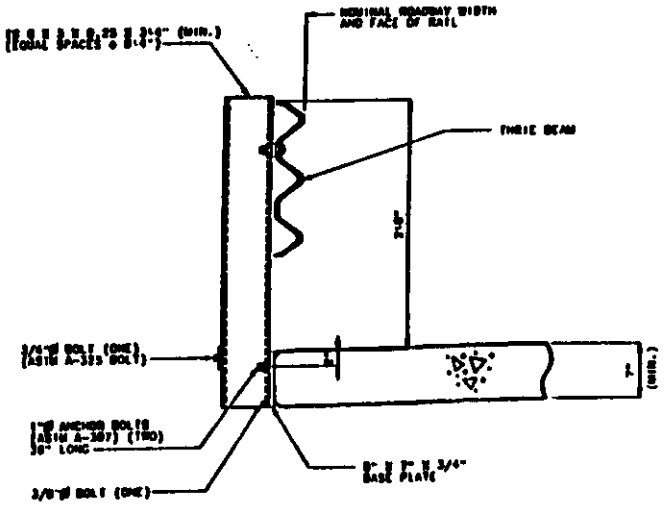
REV. 10/94

FIGURE 2.6

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

STATE NO. | PROJ. NO. | SHEET NO.





THIS APPROVED RAIL IS DISTINGUISHED BY THE UNIQUE BASE PLATE CONNECTION AT THE EDGE OF THE SLAB, TUBULAR POSTS AND THE THRIE BEAM RAIL. IT MUST HAVE AN APPROACH ROADWAY AND TERMINAL SECTION OFF THE ENDS OF THE BRIDGE.

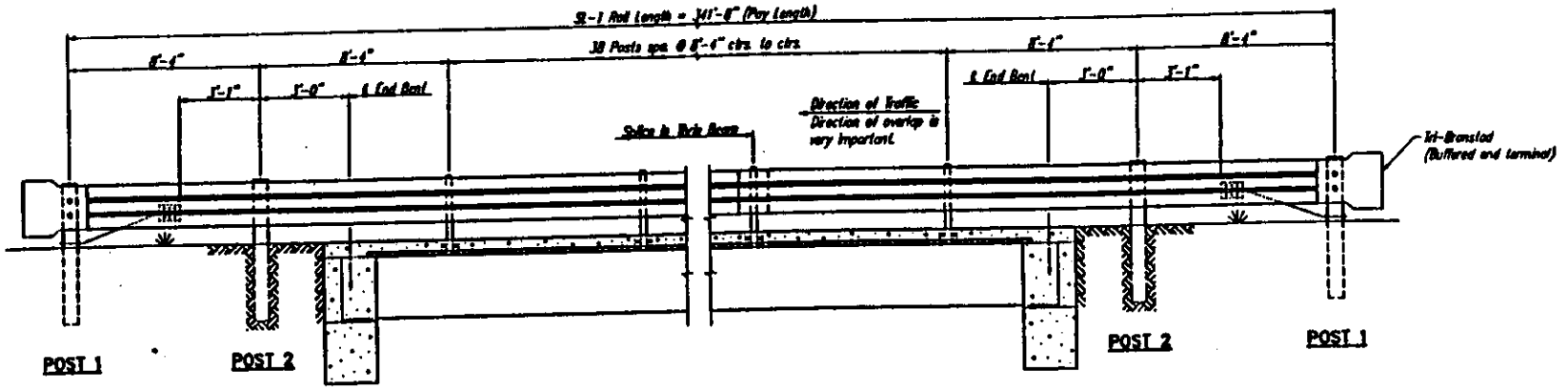
IT DOES NOT HAVE A CHANNEL AT THE TOP OF THE RAIL.

THE POST SPACING FOR THE APPROACH ROADWAY AND TRANSITION SECTIONS ARE 6'-3". THE TERMINAL SECTION SHALL BE A BREAKAWAY CABLE OR TURNED DOWN TYPE.

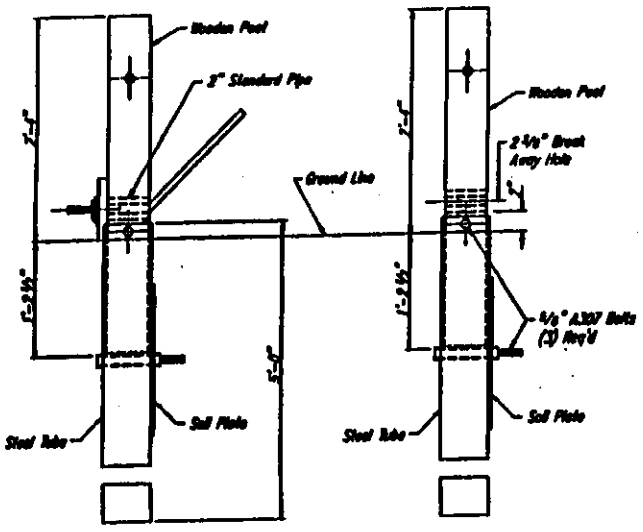
SL-1 BRIDGE RAILING

DETAILED OCT. 1993 | NOTE: THIS DRAWING IS NOT TO SCALE. FOLLOW DIMENSIONS. | SHEET NO. 3 OF 3 | APPROVED BRIDGE RAILS

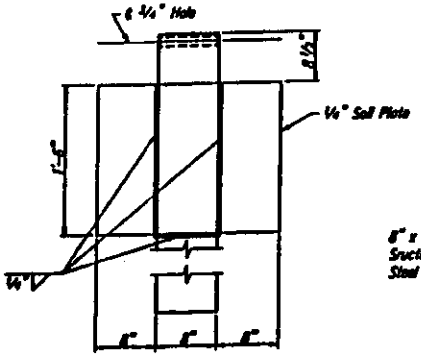
FIGURE 2.7



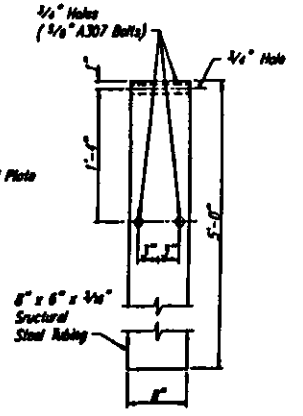
PART SECTION SHOWING RAIL



STEEL TUBE FOUNDATION

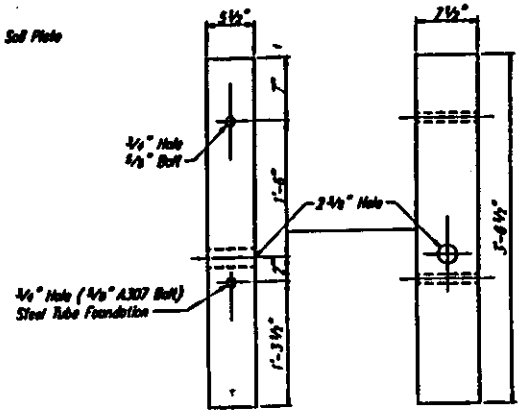


SHOP WELDED SOIL PLATE CONNECTION

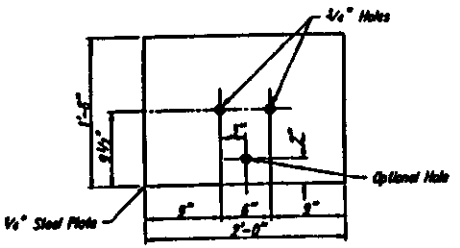


STEEL TUBE

STEEL TUBE FOUNDATION



WOOD BREAKAWAY POST



SOIL PLATE

APPROVED BRIDGE RAILS

SL-1 BRIDGE RAILING