PB98-115579

EVALUATION OF UNPAINTED WEATHERING STEEL BRIDGES IN IDAHO

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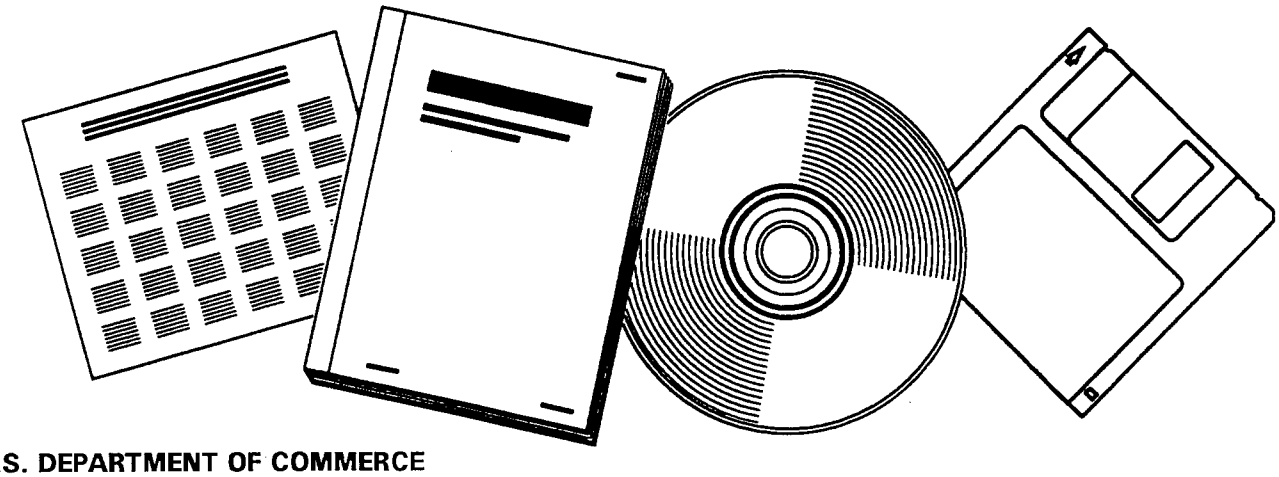

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Evaluation of Unpainted Weathering Steel Bridges in Idaho

FINAL REPORT
FHWA-ITD-RP117

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13. ABSTRACT ***(Maximum 200 words)***

Some states have reported problems with excessive corrosion of unpainted A588 weathering steel bridges. Considerable savings in initial and life cycle costs are anticipated when using weathering steel, but only if good long range performance is attained. The Idaho Transportation Department conducted its first in-depth study of a representative group of 12 weathering steel bridges to determine their present condition. Weathering steels develop a protective oxide coating that shields the underlying steel base from further corrosion when certain conditions are met. All weathering steel bridges in Idaho were identified and current inspection reports were reviewed. Data collected from the field inspections includes: visual observations of the conditions of the protective oxide coating (color, texture, adherence), conditions and details that cause corrosion problems, and plate thickness measurements with an ultrasonic gage. Samples of the oxide coating were tested for chlorides. Field inspections indicate the unpainted weathering steel on the bridges inspected is performing very well. Small areas of localized corrosion were found on four bridges. These problems can be corrected with proper design and maintenance. Continued use of unpainted weathering steel in bridges appears justified.

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A588 weathering steel, chlorides, corrosion, joint seals, mill scale, protective oxide coating

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INTRODUCTION

Nationwide, some states have reported problems with continuing corrosion of unpainted A588 weathering steel bridges. The problems identified are generally caused by contamination of the steel structure with deicing salts, exposure to coastal breezes laden with salts and extended periods of wetness. These problems have raised concerns regarding the long range performance of uncoated weathering steel bridges. A survey in the National Cooperative Highway Research Program (NCHRP) report 314, June 1989 showed that thirty-three states plan to continue using weathering steel, thirteen have stopped and four have not used it.

Since the early 1970's, the Idaho Transportation Department (ITD) has almost exclusively specified uncoated weathering steel. As of August 1995, Idaho has forty (40) weathering steel bridges in service, with more under construction and in the planning stage. Corrosion on one Idaho weathering steel bridge was found in a recent in-depth inspection and corrective action has been taken. However, no statewide comprehensive investigation of Idaho's weathering steel bridges has been made. There is the potential for significant savings in the initial and life-cycle costs in using weathering steel if good long range performance can be attained. Idaho's weathering steel bridges needed to be purposely inspected to determine overall performance and resistance to corrosion.

BACKGROUND

Uncoated weathering steel has been used in bridges in the United States since 1964. By the early 1980's, forty-three states had built weathering steel bridges. The Michigan Department of Transportation, a leader in the use of weathering steel during this period, issued a partial moratorium in June 1979 on the use of weathering steel. After a lengthy evaluation period, they found that corrosion rates were not tapering off. In 1980, the Michigan DOT expanded the moratorium to all uses of unpainted A588 steel on the state highway system.

Following the issuance of Michigan's moratorium, the American Iron and Steel Institute (AISI) organized a task grounderpass to evaluate weathering steel bridges. A first phase report was published by AISI in August 1982. Of the 49 bridges inspected; they found that 30% of the bridges showed good performance in all areas, 58% of the bridges showed good overall performance with moderate corrosion, and 12% of the bridges showed good overall performance with heavy local corrosion in some areas. The AISI report concludes that most of the bridges inspected did not need immediate attention or overall painting. The Michigan moratorium was lifted in 1990.

NCHRP Report 272 on the performance of weathering unpainted steel in bridges, published in June 1984, found that problems arising from unsuitable applications of weathering steel were not limited to Michigan alone. The report identified bridges with corrosion problems arising from unsuitable applications of weathering steel in the following states: Alaska, California, Iowa, Louisiana, Michigan, Ohio and Texas. These bridges were not developing a protective oxide coating for two reasons: (1) salt contamination from any source and (2) prolonged time of wetness. Many of these bridges have been remedially painted.

The successful performance of weathering steel depends on its resistance to environmental conditions it will be subjected to during the life of the structure. Weathering steels develop a protective oxide coating that shields the underlying steel base from further corrosion when certain conditions are met The conditions necessary for weathering steels to develop this protective oxide coating are as follows:

1. Atmospheric exposure to intermittent wet-dry cycles without prolonged wet periods.
2. Absence of heavy concentrations of corrosive pollutants, especially deicing salts.
3. Washing of the exposed surfaces by rainwater.
4. Absence of detail geometrics that trap moisture, dirt or debris and hence foster corrosion.

OBJECTIVE

The purpose of this study was to document the present condition of a representative sampling of Idaho's weathering steel bridges throughout the state. Location, structure type and environmental conditions were considered in the selection of bridges for in-depth inspections. Results of inspections were evaluated to identify which conditions, structural types and details are favorable for future Idaho bridges. Policies, design practices and specifications were reviewed and recommendations presented.

In addition, plate thickness was measured on some girder webs and flanges to establish a base for comparison on future inspections.

SCOPE OF STUDY

All unpainted weathering steel bridges in Idaho were identified. A file review of bridge inspection reports was made. A detailed list of Idaho's weathering steel bridges with summary of conditions from current inspection report files can be found in appendix B.

Annual precipitation in Idaho varies from more than 40 inches in northern and mountainous regions to less than 10 inches in the southern part of the state. Bridges, selected for field inspection, were in locations that would give a good representation of the varying climatic conditions throughout the state. Because concerns were expressed as to the potential for corrosion problems in the interior of steel box girders, Idaho's three (3) weathering steel box girder bridges were included in the selected list. The project research committee assisted in the selection process.

A literature review of studies from state transportation departments, NCHRP reports and Steel industry reports was made. The problems that were found in other states were used to help identify potential problems in Idaho.

INSPECTION PROCEDURE

The author inspected the twelve (12) Idaho unpainted ASTM A588 bridges highlighted on the list in appendix B. ITD's Reachall was used extensively for inspection access on eight (8) of the bridges.

Measurements of web and flange plates were taken on nine (9) bridges to establish a base thickness for future inspections. An ultrasonic thickness gage was used to measure plate thickness. Prior to taking measurements, the surface of the steel was scraped with a wide blade putty knife and vigorously brushed with a wire brush to remove the outer portion of the oxide coating in order to provide a reasonably smooth surface for the probe. Results are tabulated in Appendix D.

Rust samples were taken from ten (10) of the bridges inspected. Obtaining an adequate rust samples was difficult at many sites due to the shallow thickness and tightness of the coating. The samples were tested for chlorides by ITD's Central Materials Laboratory. See Appendix C for results of the chloride tests.

Photographs were taken to document conditions found at each of the bridges. In addition to a close-underpass visual inspection of the steel surface, the oxide coating's adhesion was checked by tapping with a hammer, scraping with a wide blade putty knife and vigorous brushing with a wire brush. After removal of the outer oxide coating, the surface was inspected visually and its smoothness checked to determine extent of pitting. The tables for color of oxide and texture of oxide from NCHRP Report 314 were used as a guide for visual inspection of the oxide coating. The tables are shown in Appendix E.

Other states' experiences with weathering steel found that roadway drainage getting onto the steel from deck drains, leaking deck joints and through deck cracks were the primary causes of corrosion problems. Therefore, the scope of the inspection was expanded to include the deck, deck drains, deck joints and bearings.

SUMMARY OF FINDINGS

PROTECTIVE OXIDE COATING: A uniform protective oxide coating on the exterior faces of the exterior girders has developed on all of the Idaho bridges inspected. This coating is similar from bridge to bridge and was found to be tightly adhered to the steel except for a few localized areas. The coatings in the higher precipitation areas were generally heavier and darker in color.

On most bridges there is a distinct difference in the steel surfaces between sheltered interior surfaces and the exposed faces of the exterior girders. The sheltered surfaces on most bridges were not blast-cleaned and have considerable mill scale, resulting in a non-uniform mottled appearance. Generally, the oxide coating in the sheltered areas is light to medium in thickness, less dense and varies in color from yellow orange to dark brown. This condition is more prevalent in areas of the state where the dry climate has not permitted the coating to fully develop. No significant problems of pitting or corrosion were observed due to the still developing oxide coating or mill scale. However, the non-uniform color has a less desirable aesthetic appearance.

LAMINAR CORROSION - LOSS OF SECTION: No significant loss of section was found on any of the twelve (12) Idaho bridges inspected. See plate thickness measurements in Appendix D. However, localized areas of laminar or large flake corrosion with the probability of some slight loss of section were found on the Bonners Ferry Bridge, Ninth St. Bridge, American Falls Bridge and the Broadway Bridge. See reports on these bridges for specifics in Appendix A.

Four principal causes for these corrosion problems were identified. These include: (1) runoff water contaminated with deicing salt leaking through deck joints onto the steel, (2) deck drainage water from deck drains being blown onto the steel, (3) accumulation of debris on bottom flanges, and (4) bird nests (pigeon and swallow) attached to the steel. These problems can be readily corrected by keeping drainage water away from the steel, remedial painting of steel under joints, and periodic cleaning to remove accumulated debris and bird nests.

MILL SCALE: ITD's current practice is to require blast cleaning of the exterior face of the exterior girders and bottom surface of bottom flanges to remove mill scale and other substances. The purpose of this is to provide a surface suitable for the formation of the protective coating. All blast-cleaned surfaces were found to have weathered uniformly and provide a more aesthetically pleasing appearance. On all of the visible steel surfaces of the NW Caldwell IC the mill scale had been removed by blast cleaning and all surfaces developed a uniform color, even the web plates of the interior girders. Photographs can be found in Appendix A.

The surfaces that had not been blast cleaned had considerable mill scale. Except for the top of the bottom flanges, the mill scale is tightly adhered to the steel. Loose mill scale on the tops of the bottom flanges was found on several bridges.

The loose mill scale can cause corrosion by trapping moisture and creating a longer period of wetness. There is some flaking of mill scale on girder webs, floor beams and cross frames. No problems from this flaking were observed. However, flaking will likely continue and could accumulate on the bottom flanges and require periodic cleaning.

WELDS: No problems of pitting or corrosion of the welds were found. As intended, the welds were weathering similar to the adjacent steel plates.

BOLTS AND BOLTED CONNECTIONS: There were no problems observed with any of the bolted connections inspected. The specified high strength Type 3 bolts with corrosion resistant nuts were weathering similar to the steel plates.

STAINING OF SUBSTRUCTURE: The most notable staining of substructure concrete surfaces was found on the piers of the Ponderay Underpass and the Snake River Bridge near American Falls. Both of these bridges were built more than twenty (20) years ago and well before ITD had adopted current practices to minimize staining. Neither bridge had drip plates (water deflector plates) on the bottom flanges. Also there was no requirement to protect surfaces of the substructure from staining by wrapping with plastic or other approved material until deck placement has been completed.

Little or no staining was found on more recent bridges where drip plates and a protective covering of concrete substructure surfaces was specified. Based on these observations, the current ITD policies and specifications are considered to be effective in controlling staining.

AESTHETICS: Recognizing that opinions on what is aesthetically pleasing will vary from person to person, it is believed that most will find weathering steel bridges to be acceptable in appearance. Also, it is believed that most would consider that weathering steel bridges could be as equally pleasing as painted steel bridges. The steel surfaces exposed to view have developed a uniform brown color on the Idaho bridges inspected. At most sites, the dark brown color blends in with the natural environment.

Staining of the substructure concrete surfaces detracts from the overall structure appearance. Although methods of removing rust stains have been developed, the best solution is to prevent staining through proper design and construction.

TUNNEL EFFECT: Salt spray from roadways passing under bridges contaminating steel members has been a concern for departments of transportation since Michigan DOT found corrosion problems caused by salt contamination from spray. Five (5) of the twelve (12) Idaho bridges inspected cross over other highways. The vertical clearance over the lower roadway for these five (5) bridges varies from 16 feet to 20 feet.

The Idaho Transportation Department uses a salt-sand mixture in performing winter maintenance. Rates and number of applications varies with location and severity of

the winter. Heavier applications are likely to be applied on bridges, but specific information is not available from ITD's maintenance management system. See Appendix C.

Results of chloride tests on rust samples taken from the Ponderay Underpass, Fourth St. I.C. and Vista Underpass were less than 5 PPM, 280 PPM and 99 PPM respectively. Complete test results are tabulated in Appendix C. The chloride contents on the Fourth St. I.C. and the Vista Underpass are higher than was expected from the natural environment at these bridge sites, indicating some contamination from salt spray. However, no corrosion problems caused by salt spray were observed at any of the five (5) bridges that crossed over highways. Although no corrosion problems from salt spray were found on Idaho bridges, some salt contamination from spray is occurring and monitoring through routine inspections should be continued

ACCUMULATION OF DEBRIS: Bird nests and bird-droppings were found on several of the I girder bridges. Corrosion from bird nests was evident at one field splice on the American Falls Bridge. Also, loose mill scale was found on the top of I girder bottom flanges. Debris from construction was found inside the box girders on the Ninth St. Bridge. Dirt, gravel, bird-droppings and other material was found on some beam seats. For instance, 3 inches of debris was found on pier 1 of the Broadway Bridge. Except as noted above the steel surfaces were found to be reasonably clean with no significant accumulation of dirt. The exterior surfaces of the steel box girders were found to be exceptionally clean.

In order to prevent additional corrosion, it is important to remove all bird nests and accumulations of debris on all steel surfaces. ITD's Reachall has recently been outfitted with a high-pressure washer. This equipment can provide access to all areas of the bridge superstructure for cleaning of beam seats and steel surfaces. It is expected that a program to clean all Idaho weathering steel bridges will be implemented in 1996.

DECK JOINTS: Eleven (11) of the twelve (12) bridges inspected had two (2) or more deck expansion joints. The exception is the US 20 bridge over the South Fork of the Teton River. Types of expansion joints used on the remaining eleven (11) bridges inspected include: armored with compression seal, sliding plates with neoprene trough, strip seal and finger plate joints with neoprene troughs.

The NW Caldwell IC has a strip seal joint at each abutment. The joint at the west abutment is leaking, but water is not getting on the steel members, and no corrosion was found. The seal is about 3 inches below the deck surface and is full of dirt and sand. This type of joint requires frequent cleaning.

The St. Maries Bridge, Broadway Bridge, Fourth St. IC Bridge, Ninth St. Bridge and the Glenns Ferry Bridge have armored joints with compression seals at each abutment. Although these joint seals appear to be in good condition, most leak. Corrosion was found under the joint at Pier 1 on the Broadway Bridge and inside

the box girders at Abutment 2 of the Ninth St. Bridge. Salt contaminated water leaking through the deck joints is believed to be the primary cause.

The Grade Separation # 1 Bridge near Bliss and the American Falls Bridge have sliding plate deck joints with a neoprene trough at each abutment. These joints are in good condition and the troughs appear to be effective in controlling the drainage. No corrosion problems were found under these joints.

The Bonners Ferry Bridge, the Glenns Ferry Bridge, and the American Falls Bridge each have two finger joints with a neoprene trough. The troughs at the Glenns Ferry and American Falls Bridges are in good condition and are keeping drainage water away from the steel. The troughs at both abutments on the Bonners Ferry Bridge have failed and are essentially open joints. Corrosion was found on the joint support beam, ends of girders and bearings. Considerable debris falling from logging and wood chip trucks plugged the trough. Lack of access made it difficult to remove the debris from the trough. A construction project to control the roadway drainage at the joints, replace or repair abutment bearings, and also clean and paint steel members within 12 feet of the joint is being developed.

The railroad bridges at Ponderay and Vista have sliding plate joints. The joints on the Ponderay Bridge are leaking but are not causing a serious problem at this time. The sliding plate joints with compression seals on the Vista Bridge were not inspected. These joints are covered with ballast.

The South Fork Teton River Bridge has fixed abutments with no deck joints and is performing as intended. No problems were found.

DECK DRAINS: Except for the American Falls Bridge, the deck drains were found to be functioning properly in keeping roadway drainage water away from the steel members. Some of the drain pipes on the American Falls Bridge in spans 3, 4 and 5 stop at or near the bottom flange, allowing drainage water to blow onto the bottom girder flange. Light corrosion was found on the north girder bottom flange, but did not occur at all drain pipes. This condition should be investigated to see if the problem drains can be plugged or pipes extended. Washing the steel in these areas to remove chlorides is recommended.

DECKS: The concrete decks on the inspected bridges were found to be in good condition. Most decks had minor hairline transverse cracks. Random cracking in the top of the deck was observed on the South Fork Teton River Bridge. No evidence of roadway drainage water leaking through deck cracks and onto the steel was observed.

BEARINGS: A wide variety of bearings were used on the twelve (12) bridges inspected. The inspection of bearing units was primarily limited to bearings located at deck expansion joints.

The Ponderay RR Underpass, Glenns Ferry Bridge, Vista RR Underpass, and NW Caldwell IC have weathering steel shoe and rocker bearings. These bearings

exhibit a uniform oxide coating and are functioning as intended. No corrosion problems were observed with these bearings.

The St. Maries Bridge and Abutment 1 of the Broadway Bridge have neoprene bearings. Except for some deformation, these pads are performing as intended.

The Bonners Ferry Bridge and the Ninth St. Bridge have guided sliding pot bearings. Corrosion was found on all bearings at both abutments on the Bonners Ferry Bridge. It appears that pack rust has formed between the stainless steel sheet and the upper plate, forcing the stainless sheet to separate from the upper plate. Also the TFE sheet is loose on the south girder at the north abutment and is coming out. The upper bearing plate has some corrosion. Repair or replacement of this bearing should be given high priority.

The pot bearings on the Ninth St. Bridge have a light coat of rust. No problems with these bearings were observed; however, access to the bearings is restricted and therefore limited our inspection.

The Fourth St. IC and Grade Separation #1 Bridge have TFE-stainless steel bearings at each abutment. The TFE sheet on the east girder bearing at Abutment 1 of the Fourth St. Bridge has de-bonded and is protruding out the side. Improper installation is suspected to be the cause of this problem and the bearing needs to be replaced. All other bearings are in good condition and performing as intended.

The rocker bearings at piers 3 and 6 on the Glenns Ferry Bridge and the pot bearings at piers 4 and 7 on the American Falls Bridge were recently replaced with TFE-Stainless steel sliding bearings. Except for some light rust on the bearings on the Glenns Ferry Bridge, they are in good condition and functioning properly.

On the Broadway Bridge the TFE sheet has de-bonded and curled up on the first south interior girder at Pier 1. Cause of this bearing failure is attributed to the three (3) inches of debris and leaking joint. The beam seat needs to be cleaned and bearings re-inspected.

A more detailed report of findings along with photographs for each bridge inspected can be found in Appendix A.

CONCLUSIONS

The unpainted weathering steel on the twelve (12) Idaho bridges inspected is performing very well. Although some areas of localized corrosion were found on four (4) bridges, these problems can be readily corrected on existing bridges and can be prevented on future bridges with proper design and maintenance.

The inspected bridges are located in rural and urban areas, but none in or near an industrial area. No significant difference in the steel condition was found between urban and rural locations. Results of field inspections indicate that the micro environment was suitable for the use of weathering steel at all sites. With the limited number of industrial areas in Idaho and the emphasis on clean air standards,

it is highly unlikely that sulfur trioxide levels in Idaho will exceed the threshold level of 2.1-mg/100-cm 2-day average. Therefore, it is expected that sulfur trioxide will rarely, if ever, influence future selection of weathering steel use in the state.

An FHWA Technical Advisory for uncoated weathering steel in structures was issued in October 1989. The ITD Bridge Section has been following the Technical Advisory since its publication and has incorporated it in the Bridge Design Manual. All of the bridges inspected were built before the Technical Advisory was issued. Based on the findings of this study, the Technical Advisory provides the necessary guidelines and recommendations which when followed will result in structures that will perform very well. A copy of ITD's guidelines for weathering steel use in bridges can be found in Appendix F.

RECOMMENDATIONS:

- Policy: The conditions found during field inspections clearly indicate that ITD's bridge design policy on the use of weathering steel in bridges has been effective and should be continued. The selection criteria requiring evaluation of each potential site will provide assurance that unsuitable applications of weathering steel will not occur.
- Blast cleaning: Change the standard specifications to require all steel surfaces, except those embedded in concrete, be blast cleaned to remove all mill scale. This will eliminate accumulation of loose mill scale on tops of bottom flanges, provide a more uniform appearance and aid inspections.
- Box Girders: Provide inspection access into box girders at or near all expansion joints. Increasing access will assist in making inspections and in performing maintenance when necessary.

  Provide details that will minimize entrance of water and install drains to remove any water that might enter. Box girder drains need to be located to prevent ponding inside the box, and be large enough to avoid plugging (3 inch diameter is suggested). The drains should be screened and project below the bottom flange to keep drainage water away from the exterior steel surfaces.

  Modify the specifications to require complete removal of all dirt and construction debris from the interior of steel box girders.
- Drip bars: Use drip bars on bottom flanges to control staining of substructure concrete and to minimize amount of water getting on the bearings.
- Bearings: Set bearings on concrete pedestals so they are 2" to 3" above adjacent concrete surfaces. Protect exposed steel surfaces with an appropriate coating. On TFE-Stainless Steel Bearings, seal the edges of the stainless steel sheet.

- Painting: The conditions found on field inspections verify that most joints will eventually leak. Therefore, the practice of painting all steel within a distance of 1.5 times the depth of the girder from the joint should be continued.
- Maintenance: An effective maintenance program is essential to ensure weathering steel bridges serve their intended service life. The routine maintenance actions shown in Appendix F (Weathering steel selection criteria from the Bridge Design Manual) need to be scheduled so that they can be performed on all weathering steel bridges in a timely manner. This information should be added to ITD's Maintenance Manual so that it will be readily available to all maintenance personnel.

  The recently installed pressure washer on Bridge Inspection's Reachall should be helpful in performing some maintenance tasks.

REFERENCES

AISI	1982	"Performance of Weathering Steel in Highway Bridges," A First Phase Report by a Task Group on Weathering Steel Bridges, American Iron and Steel Institute, Washington D. C., August 1982.
AISI	1995	"Performance of Weathering Steel in Highway Bridges," A Third Phase Report, American Iron and Steel Institute, Washington D. C., 1995.
Albrecht	1984	Albrecht, P. and Naeemi, A. H., " Performance of Weathering Steel in Bridges," NCHRP Report 272, Transportation Research Board-National Research Council, Washington D. C., July 1984.
Albrecht	1989	Albrecht, P., Coburn, S. K., Wattar, F. M., Tinklenberg, G. L., Gallagher, W. P., " Guidelines for the Use of Weathering Steel in Bridges," NCHRP Report 314, Transportation Research Board-National Research council, Washington D. C., June 1989.
FHWA	1989	FHWA Technical Advisory T 5140.22 on Uncoated Weathering Steel in Structures, U.S. Department of Transportation, Federal Highway Administration, Washington D. C., June 1989.
Mathay	1993	Mathay, W. L., "Uncoated Weathering Steel Bridges," Vol. I Chapter 9, Highway Structures Design Handbook, American Institute of Steel Construction, Pittsburgh, PA, January 1993.

BONNERS FERRY BRIDGE: US - 95 over Kootenai River and UPRR located in Bonners Ferry, Idaho.

Description: A 1380 ft. - 10 span post-tensioned continuous welded plate I girder bridge. The bridge was 11 years old at time of inspection.

Environment: A rural environment with a mean annual precipitation of about 30 inches. Use of deicing salts on bridge is heavy. Minimum clearance above normal water surface is 20 feet. Traffic on bridge is 11,000 ADT.

Steel Surface Conditions: The exterior faces of the exterior girders have a uniform dark brown oxide coating that is tightly adhered to the steel providing a good protective coating. The interior surfaces of the steel members have a considerable amount of mill scale and a non-uniform appearance. Except for the bottom flanges the mill scale is tight. Mill scale on the top of the bottom girder flanges is loose and retains moisture. Corrosion was found on the joint support beam, ends of girders, end cross frame and bearings at both abutments. Corrosion is being caused by roadway drainage coming through the deck joints and onto the steel. Except at the joints, no other corrosion or pitting was observed. There are pigeon nests and pigeon droppings on the bottom flanges and cross bracing. Except as noted above, the steel members are reasonably clean and in good condition.

Bearings: All bearings are pot bearings. The pier bearings have a light coat of rust and appear to be in good condition. The expansion pot bearings at both abutments have heavy corrosion, causing the stainless plate to come loose from the upper plate. Also the TFE sheet has debonded on one bearing.

Deck Joints: Steel finger joints with trough at both abutments. The trough at both abutments has failed and allows roadway drainage to pass through the joints and onto the steel below, causing serious corrosion problems.

Deck: The post-tensioned concrete deck has a modified latex concrete overlay. There are some hairline transverse cracks, but no evidence of leaking was observed. The deck is in good condition and has no spalls.

Staining: No staining of concrete pier surfaces observed.

APPENDIX A

Bonners Ferry Br.
Bridge Number
09520G 507.57

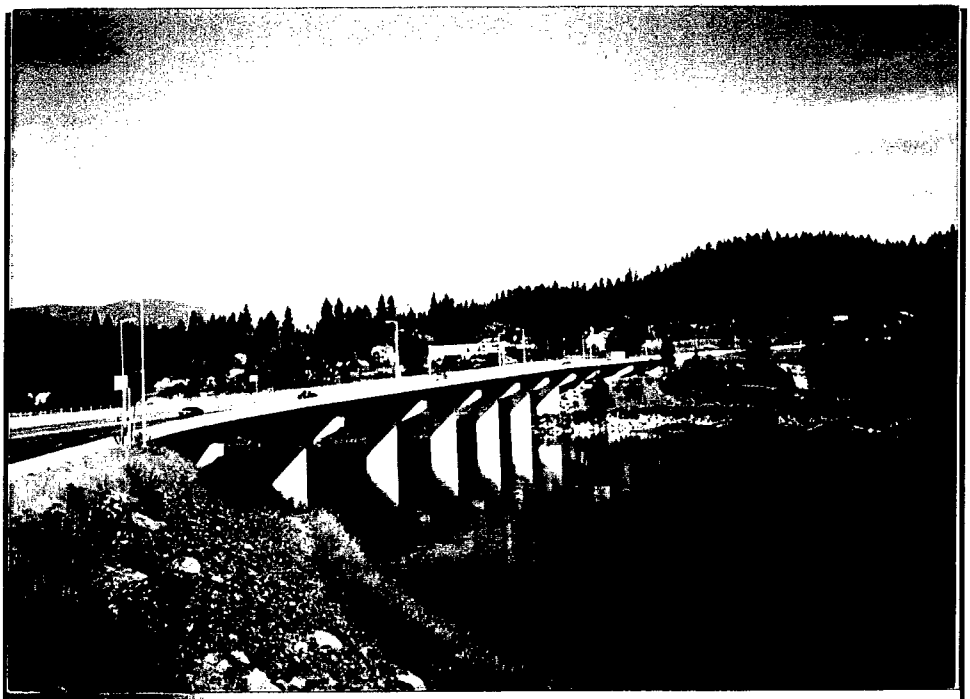

Photo No. 1
View of upstream side from south approach

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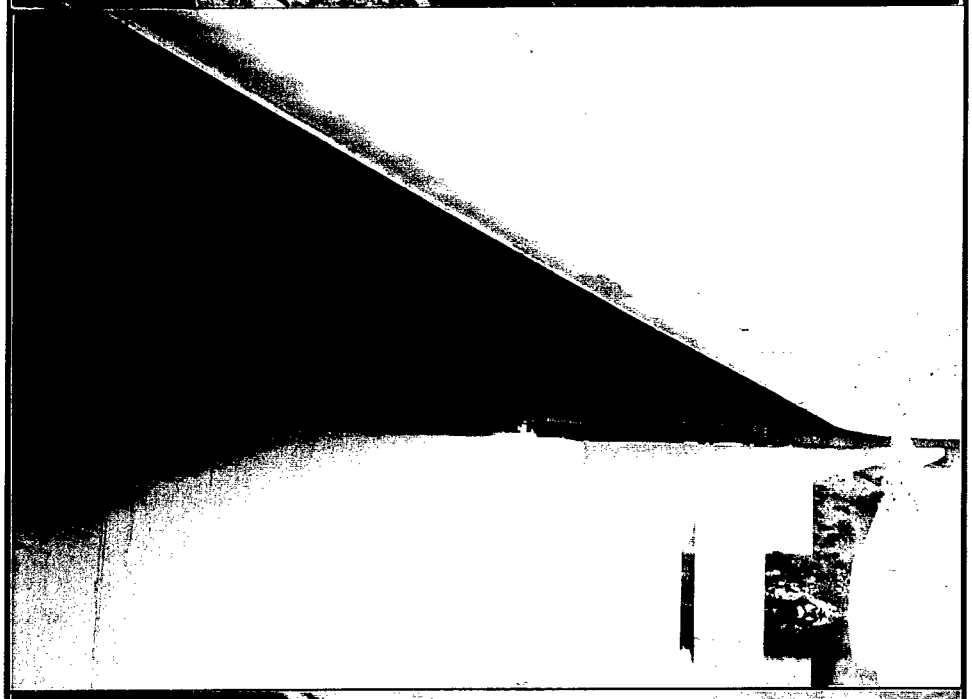

Photo No. 2
View of east exterior girder. Note the uniform dark color of girder and no stains on pier.

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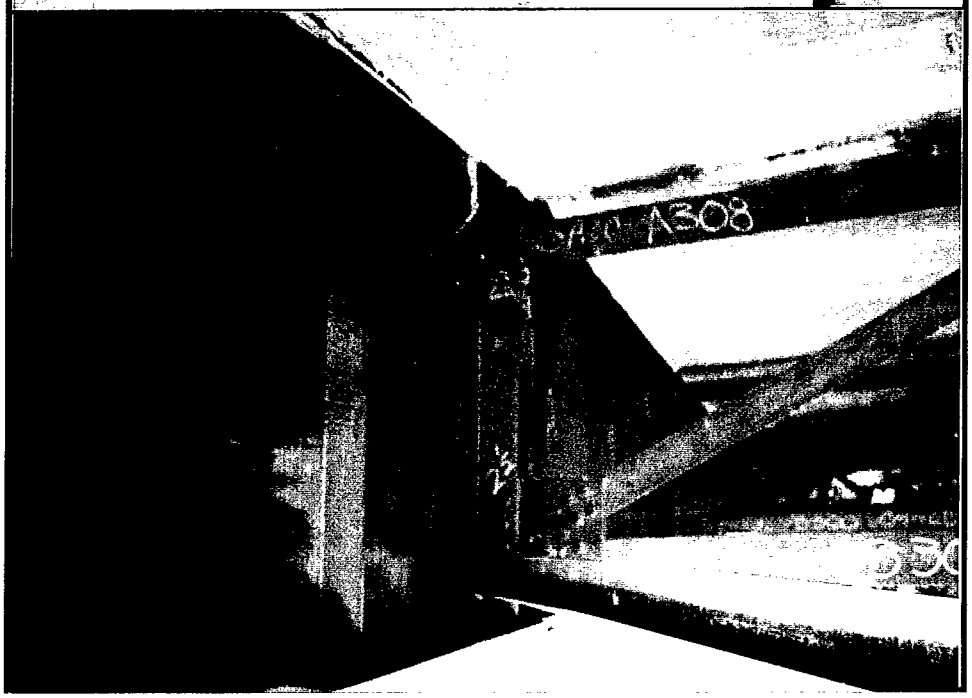

Photo No. 3
View of interior bay showing cross frames and lateral bracing. Note mill scale and non-uniform appearance

9-12-95

APPENDIX A

Bonners Ferry Br.
Bridge Number
09520G 507.57

Photo No. 4
View looking up at deck expansion joint support beams.

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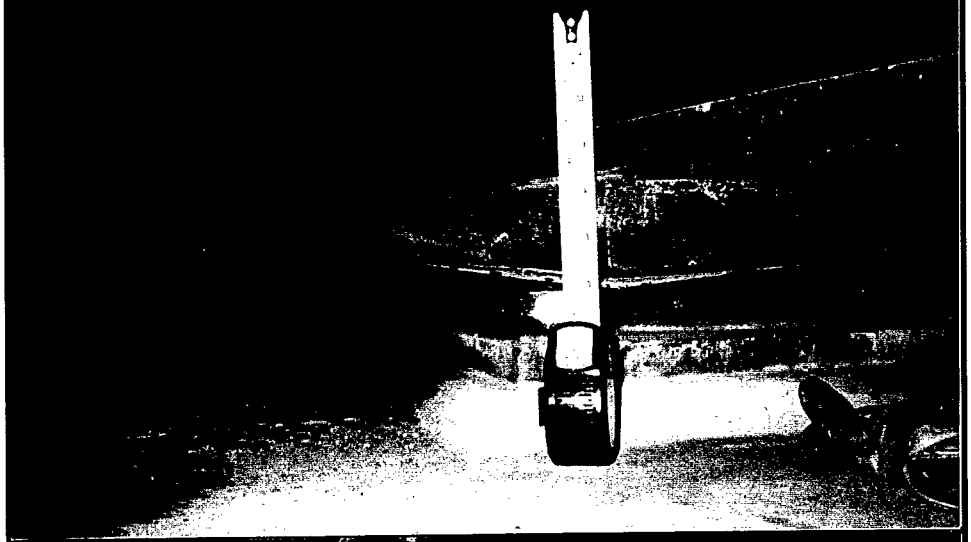

Photo No. 5
Expansion pot bearing at abutment. Note stainless sheet has come loose from upper plate.

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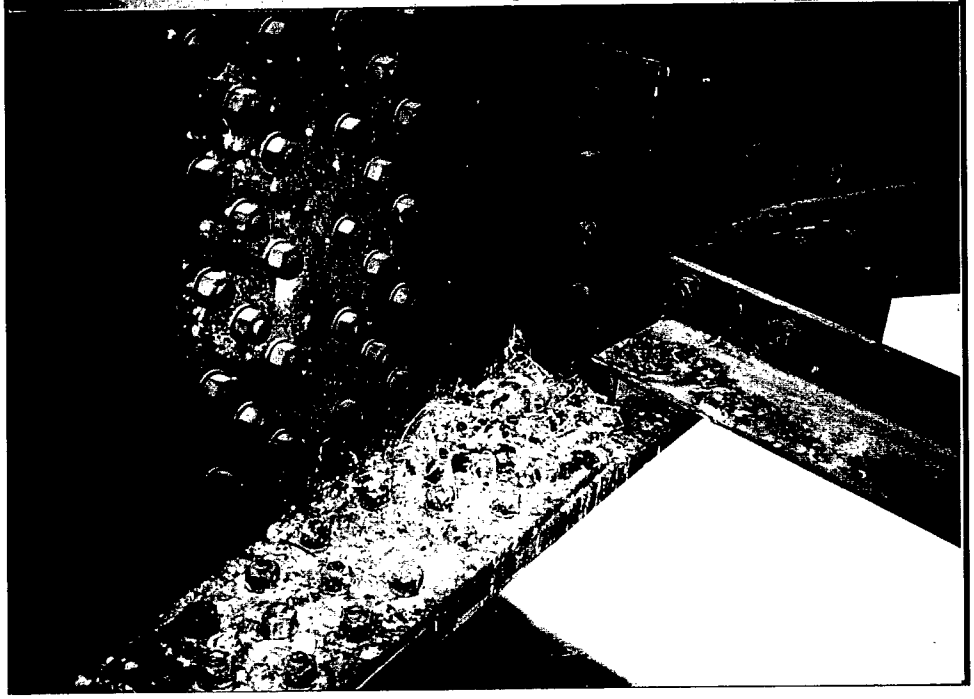

Photo No. 6
Bird nest on bottom flange at cross frame connection.

9-12-95

ST. MARIES BRIDGE: SH 3 over the St. Maries River at the south edge of St. Maries, Idaho.

Description: A 240 ft. - 3 span continuous rolled I beam bridge. The bridge was 18 years old at time of inspection.

Environment: A rural environment with a mean annual precipitation of 30 inches. Use of deicing salt on bridge has been light. The clearance above normal water surface is 15 feet. Traffic on bridge is 6200 ADT.

Steel surface condition: The exterior face of exterior beams has a uniform dark brown heavy oxide coating that is tightly adhered to the steel, providing a protective coating. The interior surfaces have some mill scale that is tightly adhered. No pitting or corrosion was observed. Steel surfaces are clean except for bird nests and bird droppings. The steel members are in good condition.

Bearings: The neoprene bearing pads at piers and abutments are in good condition.

Deck Joints: Armored expansion joints with seals at both abutments. The joint at abutment # 1 has been modified due to the abutment rotation and has been resealed. The joints have minor leaks, but are not causing a problem at this time.

Deck: The reinforced concrete deck has a few minor hairline cracks, but no spalls and is not leaking. The deck is in very good condition.

Staining: None observed.

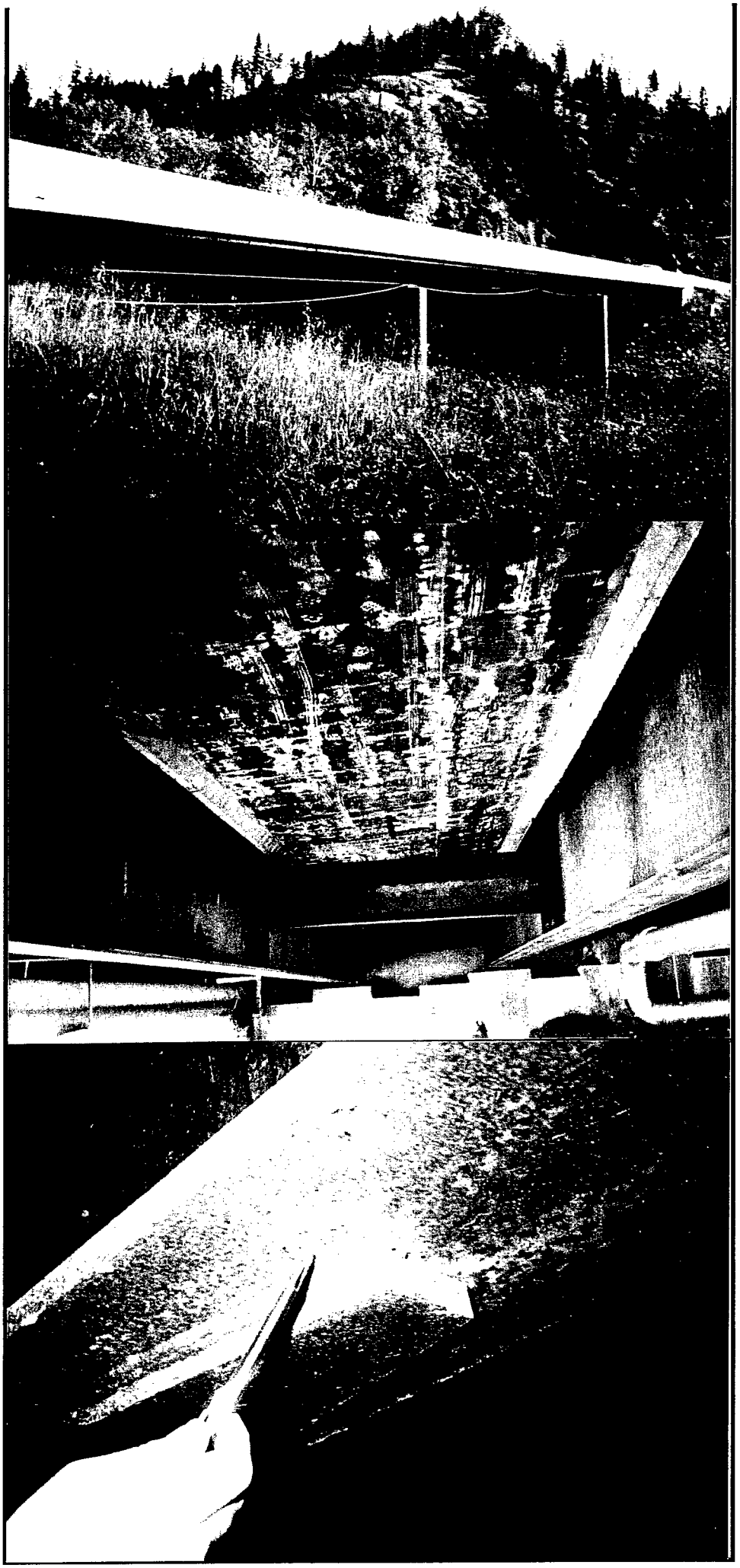

Photo No. 7
View of south side of bridge.

9-14-95

Photo No. 8
View of underside of deck and interior faces of interior beams.

9-14-95

Photo No. 9
Cover plate on bottom flange. Note mill scale and light oxide coating.

9-14-95

APPENDIX A

St. Maries Br.
Bridge Number
00300A 84.19

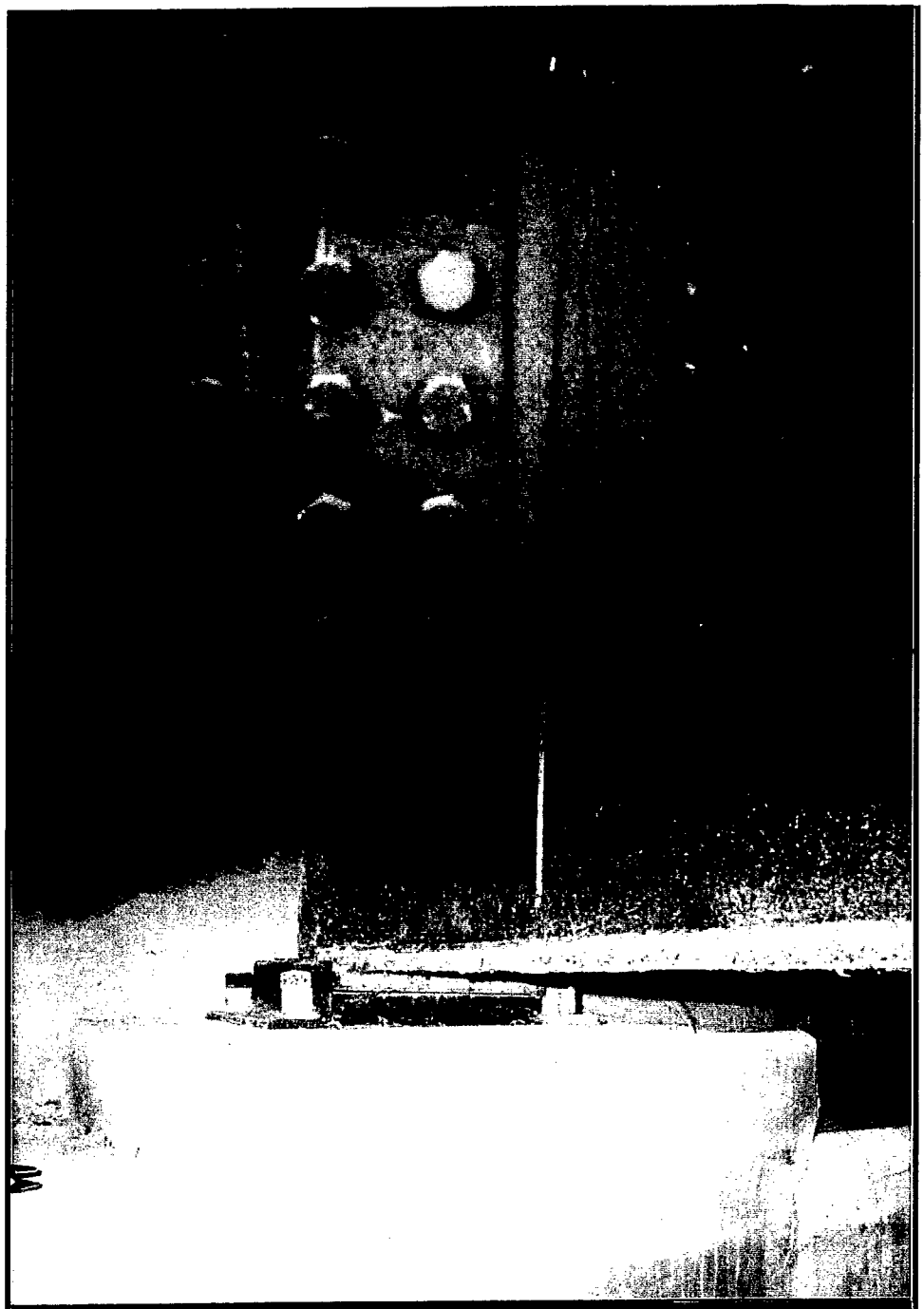

Photo No. 10
Interior view of bolted web splice. Note dark color and no corrosion.

9-14-95

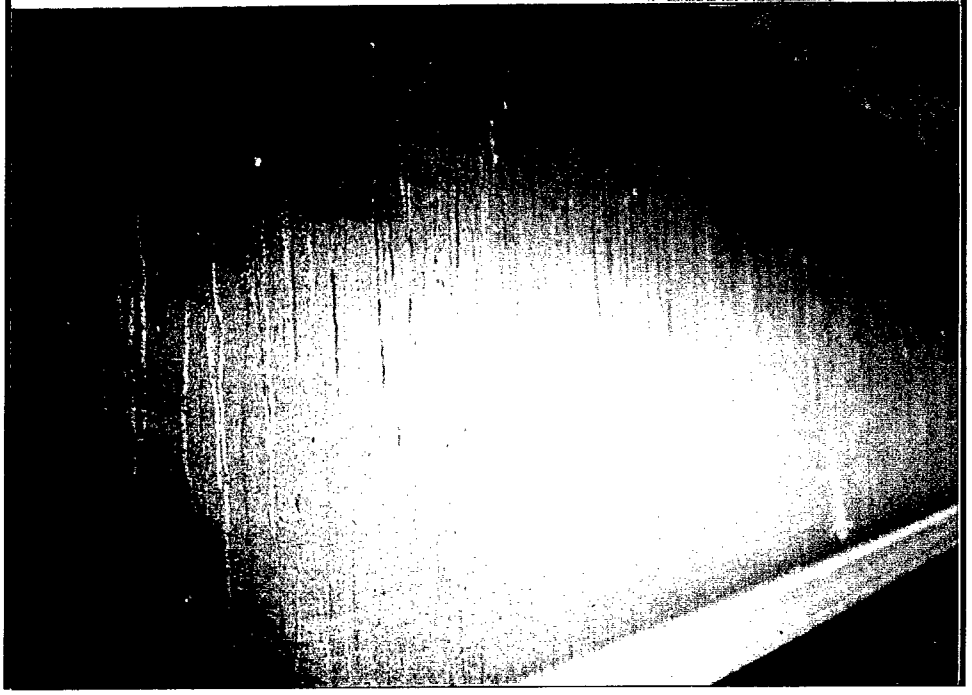

Photo No. 11
Neoprene bearing pad at abutment 2.

9-14-95

Photo No. 12
View of exterior face of web showing vertical lines from condensation.

9-14-95

FOURTH ST. IC BRIDGE: Fourth St. over I-90 in Coeur D' Alene, Idaho.

DESCRIPTION: A 205 ft.- 2 span continuous welded plate I girder bridge. The bridge was 10 years old at time of inspection.

ENVIRONMENT: An urban environment with a mean annual precipitation of 30+ inches. Use of deicing salts on the bridge and on the roadway under the bridge is heavy. Clearance above I-90 is 18.8 feet. ADT on the bridge is 26,000 and ADT on the roadway under the bridge is 27,000.

STEEL SURFACE CONDITIONS: The exterior faces of exterior girders have a uniform dark brown oxide coating. Except for a few isolated areas the coating is tight and providing the protection as intended. The interior surfaces of steel members have considerable mill scale and exhibit a non-uniform appearance. The mill scale is tight except on the top of the bottom flanges. No pitting observed. The steel members are in very good condition.

BEARINGS: TFE-Stainless steel sliding bearings at both abutments. The TFE sheet on the east girder bearing at the south abutment has come loose and is protruding out the side. This bearing is no longer functioning properly and needs to be replaced. All other bearings are performing as planned.

DECK JOINTS: Armored joints with compression seals are at both abutments. The seals appear to be in good condition and no problems observed.

DECK: A reinforced concrete deck with an asphalt chip seal wearing surface. The chip seal has been worn off in the wheel tracks. The deck has only few hairline transverse cracks and is in very good condition. No spalls or leaks were observed.

STAINING: Negligible staining of substructure concrete surfaces observed.

APPENDIX A

Fourth Street Br.
Bridge Number
97195A 1.63

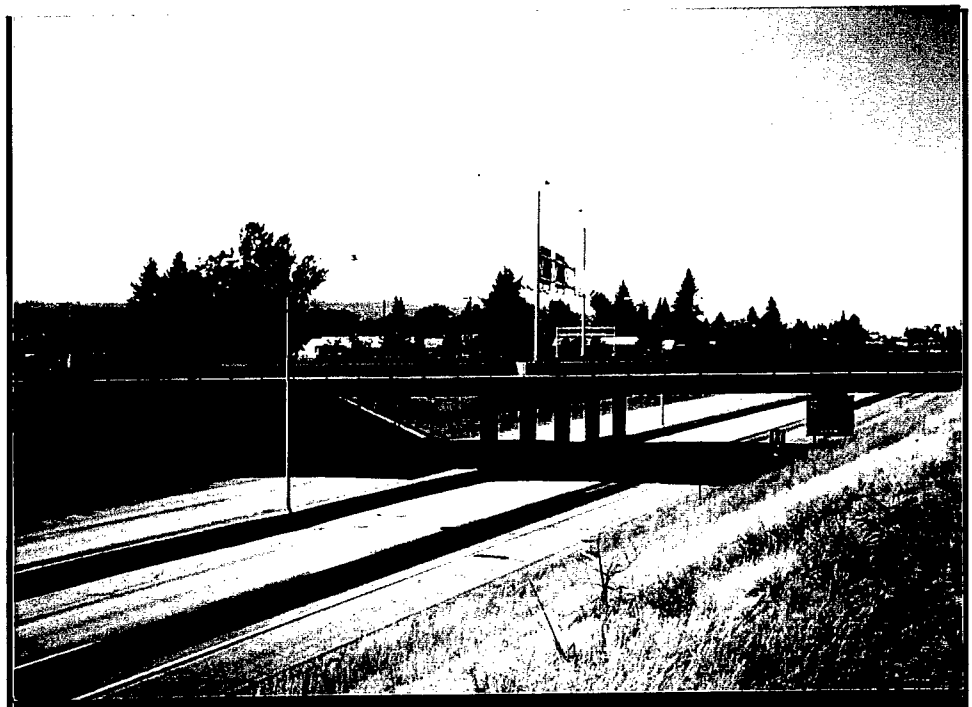

Photo No. 13
View from East Side looking west.

9-11-95

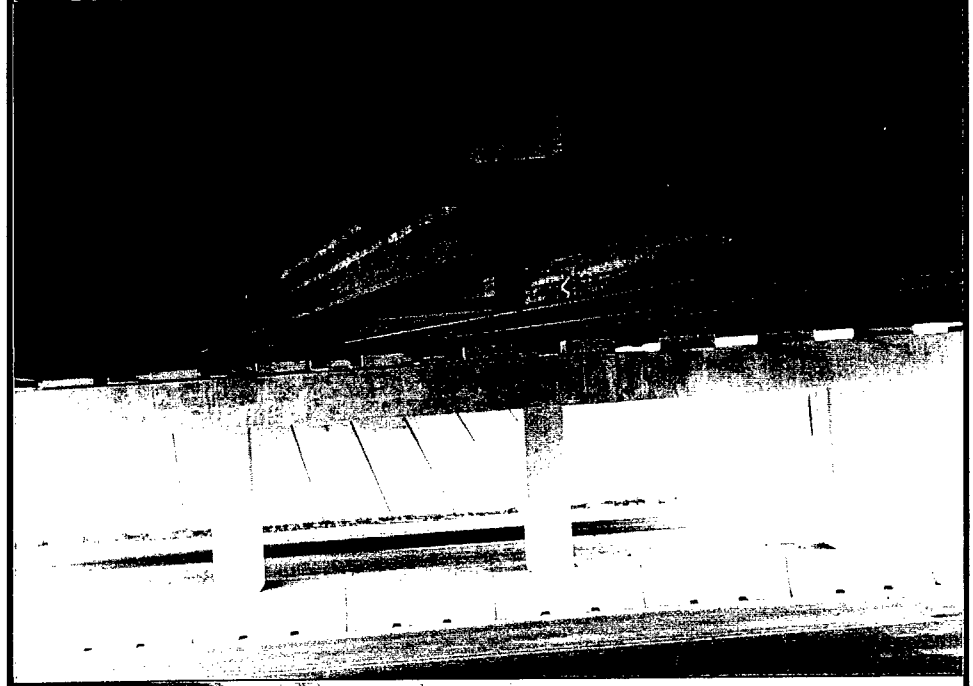

Photo No. 14
View of pier and underside of steel superstructure from north side. Mill scale is visible on girder webs.

9-11-95

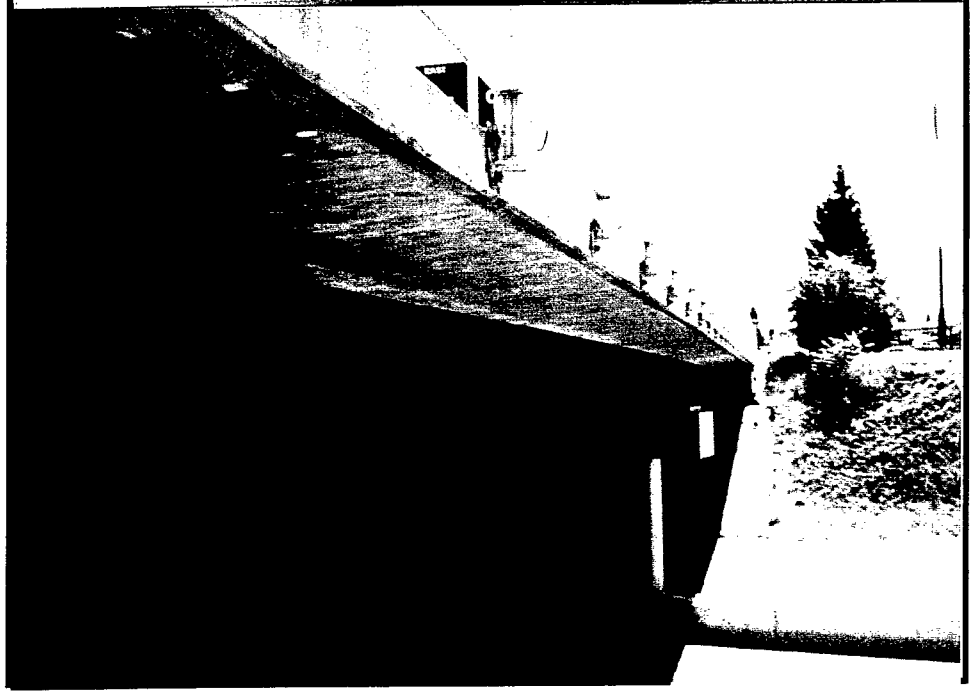

Photo No. 15
View of west exterior girder and overhang.

9-12-95

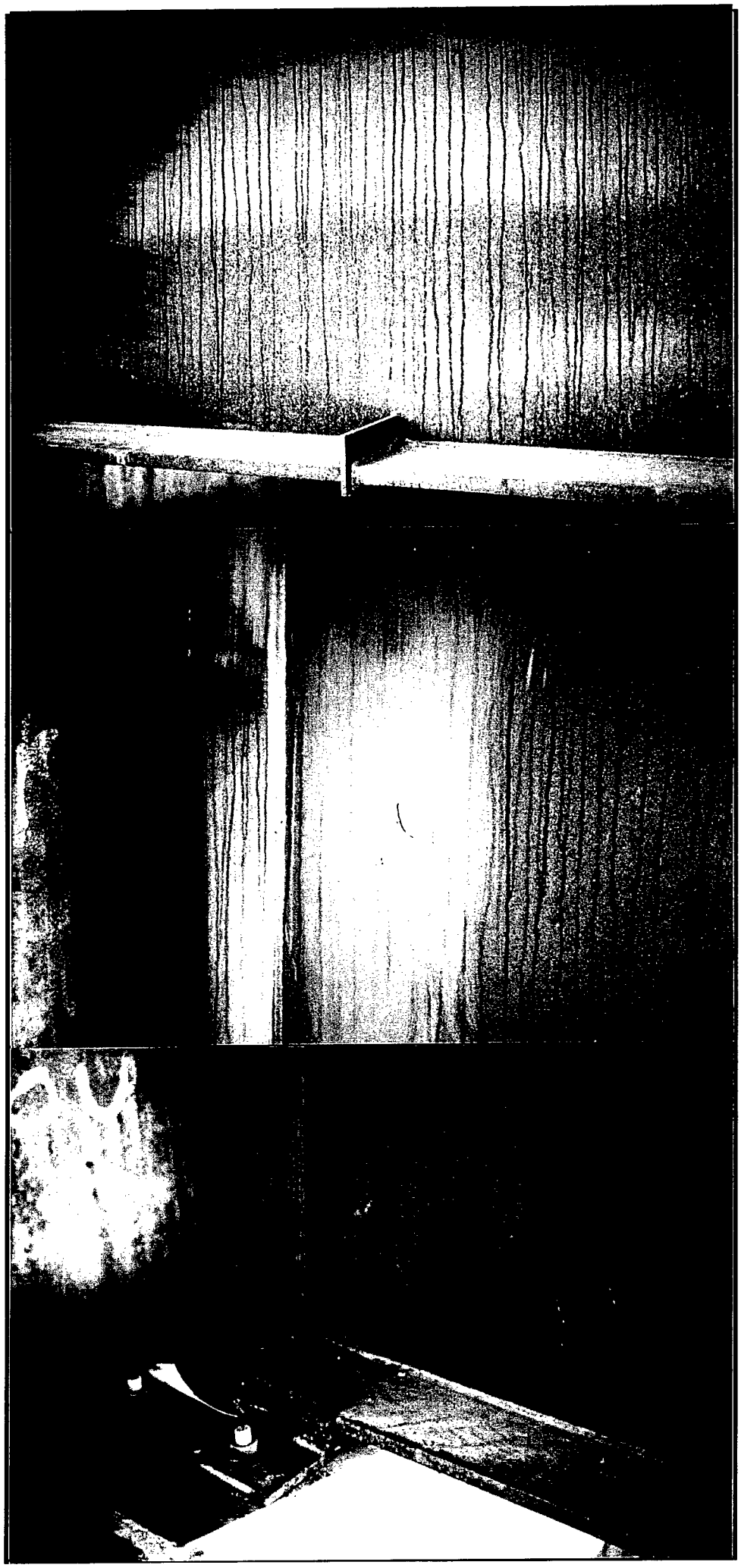

Photo No. 16
View of exterior girder. Note drip plate on bottom flange and condensation lines.

9-11-95

Photo No. 17
View of east exterior girder at South Abutment after brushing with wire brush.

9-11-95

Photo No. 18
East exterior girder bearing at South Abutment. Note the TFE sheet protruding through the angle.

9-11-95

PONDERAY UNDERPASS: SIRR over US 95 in Ponderay, Idaho.

Description: Dual 212 ft. - 2 span welded plate I girder bridges. The bridges were 22 years old a time of inspection.

Environment: A rural environment with a mean annual precipitation of about 30 inches. Use of deicing salts on the roadway under the bridge is heavy. None is used on the bridge.

Steel Surface Conditions: The exposed faces of the main girders have a heavy uniform dark chocolate brown oxide coating that is tightly adhered to the steel. The floor beams and interior girder surfaces have a non-uniform appearance with some mill scale and a dark brown oxide coating. The bottom of the deck plate has a heavy coating with a rough texture and is yellow and brown in color. Some pitting is likely and checking by cleaning to bare metal is suggested. A few small leaks were found in the deck plate. Some of these leaks are dripping on the floor beams and causing pitting and corrosion on small areas of the floor beam flanges.

Bearings: All bearings are weathering steel expansion rockers and fixed shoes. A fairly uniform oxide coating covers the bearings. No corrosion observed. The bearings are in the correct position and functioning properly. The pin on a main line end beam rocker bearing was coming out and has since been fixed. Vandalism is suspected to be the cause of the loose pin.

Joints: The sliding plate joints are covered with ballast. The joints are leaking, but no serious corrosion problems observed.

Deck: Steel deck plate with membrane seal and covered with ballast. Indications of some small leaks were observed on the underside of the deck plate. The membrane seal may have some breaks which could result in moisture being trapped between the top of the deck plate and the membrane seal and cause corrosion. An investigation to determine the condition of the membrane seal and the deck plate is recommended. In order to make an accurate evaluation, areas of ballast will need to be removed to expose the seal.

Staining: There is significant staining of the concrete surfaces at both abutments and the pier. There are no drip plates on girder bottom flanges. Also there were no requirements to protect the concrete surfaces during construction.

APPENDIX A

Ponderay Underpass
Bridge Number
995090 476.02

Photo No. 19
View looking north.
Note uniform dark brown color.

9-13-95

Photo No. 20
Top view of mainline tracks looking west.

9-13-95

Photo No. 21
View from East Abutment. Note staining on pier columns.

9-13-95

APPENDIX A

Ponderay Underpass
Bridge Number
995090 476.02

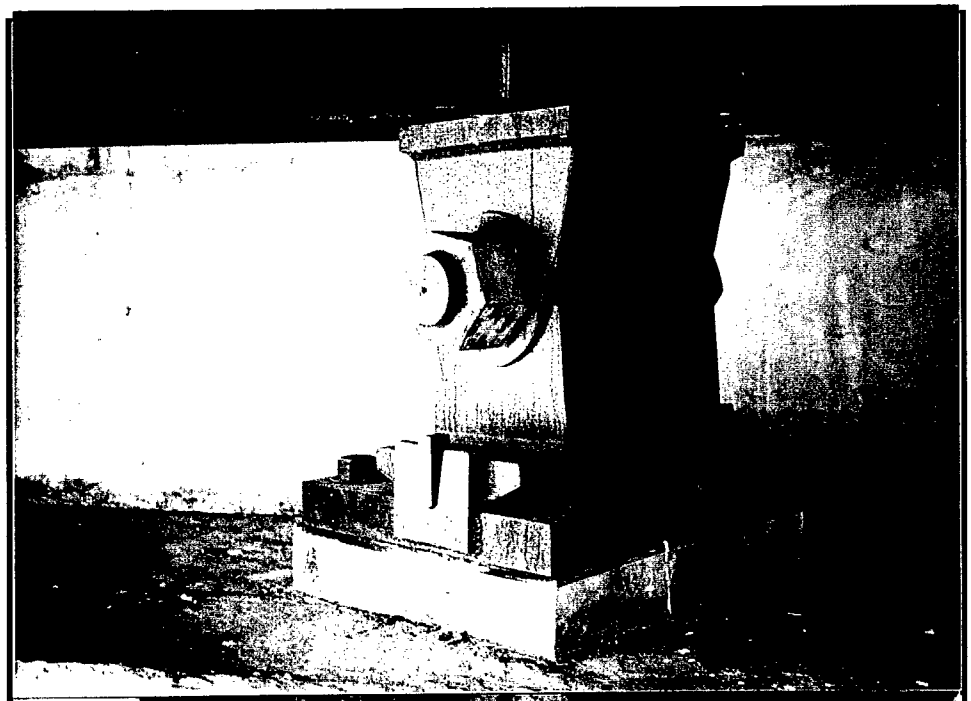

Photo No. 22
Floor beam weathering steel bearing at abutment.

9-13-95

Photo No. 23
View of bottom of deck plate and floor beam. Note discoloration at top center from leak.

9-13-95

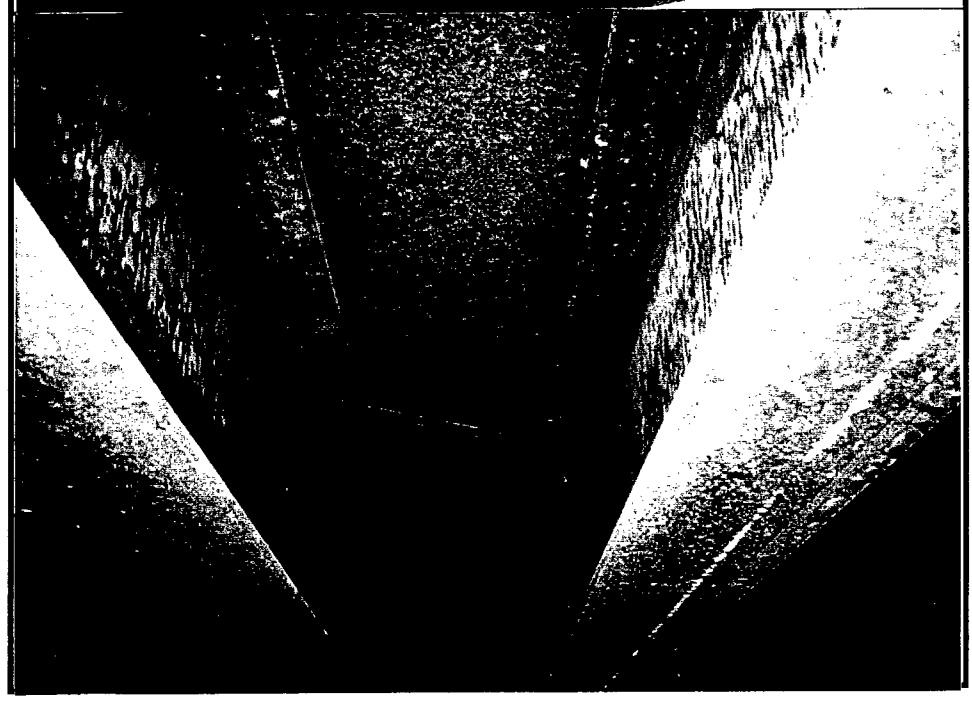

Photo No. 24
View of bottom of deck plate and floor beams. Note yellow color of floor plate.

9-13-95

NW CALDWELL IC: The NW connector over I-84 in Caldwell, Idaho.

Description: A 227 ft. - 3 span continuous steel box girder bridge. The bridge was 12 years old at time of inspection.

Environment: An urban environment with a mean annual precipitation of 12 inches. Use of deicing salts under the bridge is light, usage on the bridge was not available. The clearance over I-84 is 17 feet. Traffic on the bridge is 8,400 ADT and under the bridge is 26,000 ADT.

Steel Surface Conditions: The exposed surfaces of the box girders have a uniform medium brown oxide coating that is tightly adhered to the steel. The coating on the exterior faces is heavier and darker than the sheltered interior surfaces. The exterior surfaces are clean and free of mill scale. The inside of the box girders was dry with no evidence that moisture has been present. All inside surfaces have considerable mill scale and a non-uniform appearance. The oxide coating on the inside surfaces has not fully developed due to the dry conditions. No corrosion was found and the steel members are in excellent condition.

Bearings: The weathering steel shoes and hangers at both abutments have a uniform oxide coating and are in good condition. The pot bearings at the piers have a light coat of rust and appear to be functioning properly.

Deck Joints: The strip seal expansion joints at both abutments are full of sand and dirt. The seal is about 2-1/2 inches below the deck surface which allows accumulation of road debris. There is evidence that the joint at the west abutment is leaking but not causing a serious problem at this time.

Deck: A reinforced concrete deck with an asphalt chip seal wearing surface. The deck has no spalls and is essentially crack free. The deck is in excellent condition.

Staining: Some light staining of the pier concrete surfaces, primarily in spans I and 3, was observed. Drip plates were used only in span 2. Most staining is not visible to traffic and therefore is not considered to be a problem.

APPENDIX A

NW Caldwell IC
Bridge Number
08400B 0.89

Photo No. 25
Elevation view looking north.

9-7-95

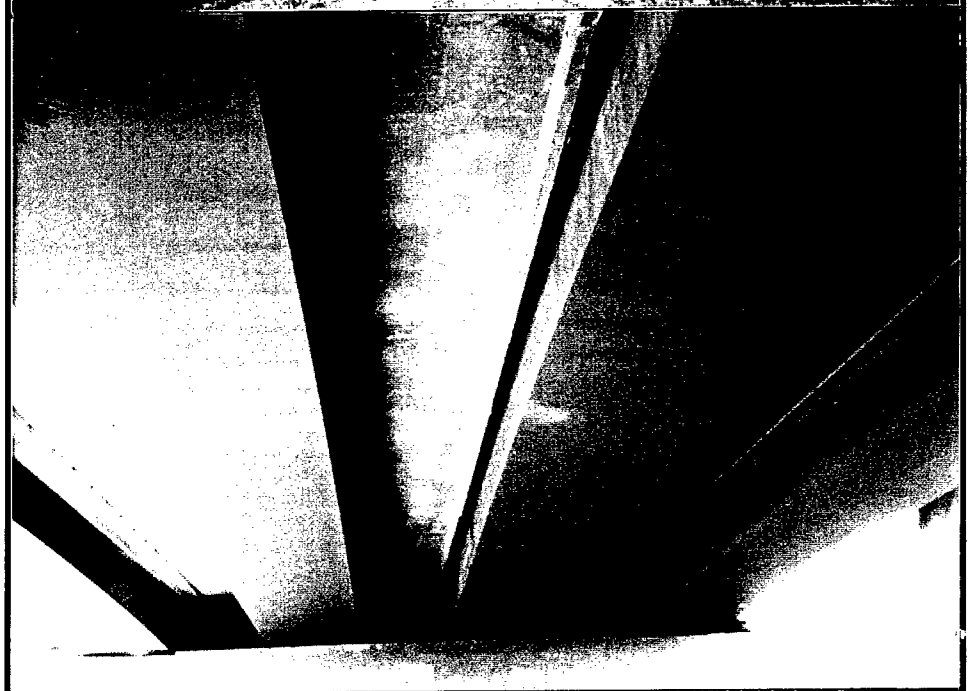

Photo No. 26
Bottom view of deck and box girders.

9-7-95

Photo No. 27
Top view of deck expansion joint at Abutment 1. About 3" of sand and dirt is in joint.

9-7-95

APPENDIX A

NW Caldwell IC
Bridge Number
08400B 0.89

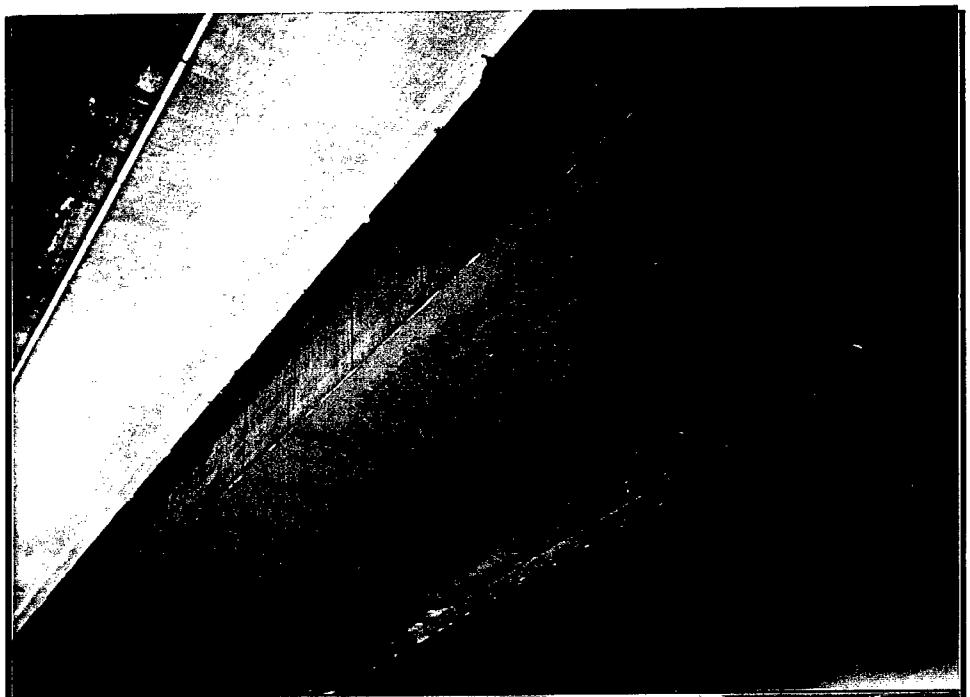

Photo No. 28
Bottom view of bottom flange and deck slab.

9-7-95

Photo No. 29
Interior of south exterior box girder in Span 3 showing web, web stiffeners and cross frame.

9-7-95

Photo No. 30
Interior of south box girder showing bottom flange stiffeners.

9-7-95

SNAKE RIVER BRIDGE NEAR GLENNS FERRY: I-84 WBL over the UPRR and Snake River 1.0 miles east of Glenns Ferry Idaho.

Description: A 1094 ft. - 7 span continuous welded plate girder bridge. The bridge was 21 years old at time of inspection.

Environment: A rural environment with a mean annual precipitation of about 10 inches. Use of deicing salts on the bridge is moderate. Clearance above normal water surface is 50 feet. Traffic on the bridge is 9,600 ADT.

Steel Surface Condition: The exterior faces and bottom of bottom flanges of main girders have dark uniform oxide coating that is tightly adhered to the steel. The sheltered interior girder faces, floor beams and stringers have considerable mill scale and exhibit a non-uniform appearance. There are pigeon nests on the wind bracing connection plates at girder webs. Otherwise the steel surfaces are clean. Fatigue cracks from out-of-plane bending were found in the main spans at the top of the floor beam connection stiffener. Details of the fatigue cracks are covered in the bridge inspectors report and has been passed on to the Bridge Engineer. No corrosion was observed through-out the bridge. Except for the fatigue cracks the steel members are in good condition.

Bearings: There are weathering steel expansion rocker bearings at piers 1,2,4 and 5, fixed shoe bearings at both abutments and at piers 4 and 5, and TFE- Stainless steel sliding bearings at piers 3 and 6. The weathering steel bearings have a uniform oxide coating. Light rust was found on the painted surfaces of the sliding bearings. All bearings were functioning properly.

Deck Joints: There are finger joints with a trough at piers 3 and 6 and armored joints with compression seals at both abutments. The joints are in good condition with only minor leaking at the east abutment.

Deck: A reinforced concrete deck with permanent metal forms. The deck has an asphalt chip seal wearing surface. Some minor hairline transverse cracks are visible on the underside of deck overhang. Deck and forms are in good condition.

Staining: Some light staining is visible on pier caps. There are no drip plates on the girder bottom flanges.

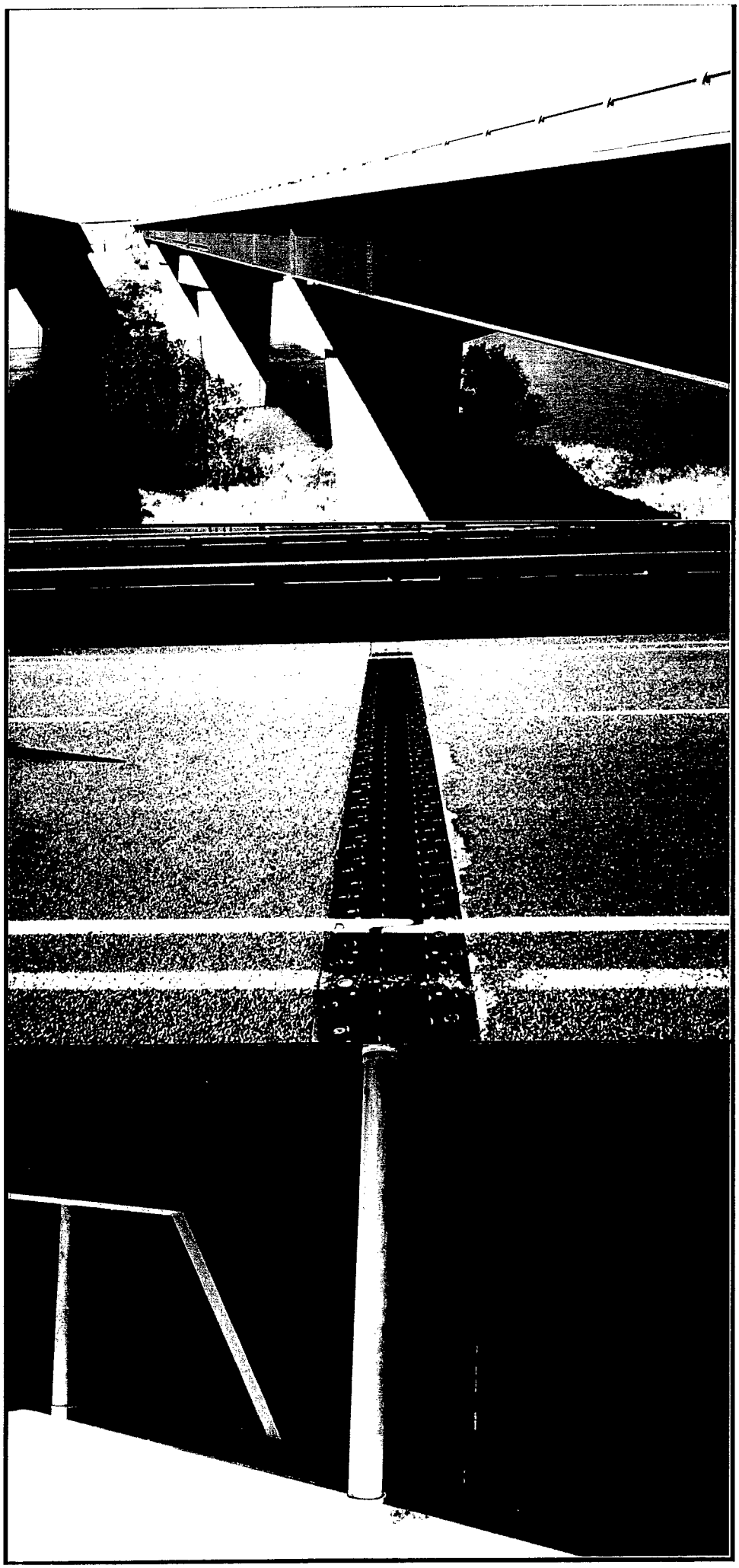

Photo No. 31
View of south exterior girder from East Abutment.

8-17-95

Photo No. 32
Top view of deck expansion joint at Pier 3. Note asphalt ship seal on the deck.

8-17-95

Photo No. 33
View of interior face of girder. Note drainpipe from trough under the deck joint

8-17-95

APPENDIX A

Glenns Ferry Br.
Bridge Number
08070C 121.61

Photo No. 34
View of exterior face of web near West Abutment showing scraped and brushed areas and tightness of coating.

8-17-95

Photo No. 35
Bolted field splice in Span 3. Light staining is visible on pier cap.

8-17-95

Photo No. 36
Weathering steel fixed bearing at West Abutment.

8-17-95

SOUTH NINTH ST. BRIDGE: Ninth Street over Boise River in Boise, Idaho.

Description: A 299 ft. - 2 span continuous steel box girder bridge. The bridge was 10 years old at the time of inspection.

Environment: The bridge is located in an urban environment with a mean annual precipitation of about 12 inches. Use of deicing salts is estimated to be moderate. The minimum clearance over normal water surface is about 12 feet. Traffic on the bridge is 20,000 ADT.

Steel Surface Condition: The exterior surfaces of the box girders have a uniform medium brown coating except at the drain holes in the bottom flange near the abutments. The coating is tightly adhered to the steel. Corrosion was found on the bottom of the bottom flange at the drain holes near the abutments. Water from inside the box passes through the field drilled 1" diameter drain holes and spreads out on the exterior surface causing corrosion. Corrosion was also found on the inside of the east box girder near the north abutment. At the time of inspection the inside of the box was dry. However, there was evidence that water had ponded on the bottom flange for a length of about 15 feet. Corrosion was found on the bottom flange and lower portion of the webs. There is debris from deck construction (sawdust, form splinters, dust and small pieces of concrete) on the bottom flange inside the box. No evidence of water leaking through the deck was found. A leaking expansion joint is the likely source of the water. The inside of the box girders at the south abutment were not inspected, but conditions are likely to be the same as those found at the north end. A drain pipe through the bottom flange should be installed, joint seals fixed, and the ends of the girders should be painted.

Bearings: The guided pot bearings at the abutments have a light coat of rust but appear to be working properly. There was a considerable amount of dust and cobwebs on the beam seat and bearings. Cleaning and re-inspection is suggested.

Deck Joints: There are armored deck expansion joints with compression seals at both abutments. The joints are partially filled with sand but the seals appear to be intact. Based on conditions inside the box girders and stains on the abutment face, both joints leak.

Deck: The reinforced concrete deck has an asphalt chip seal wearing surface. There are some hairline transverse cracks. The deck is in very good condition.

Staining: No rust stains on the concrete surfaces were observed.

APPENDIX A

South Ninth St. Br.
Bridge Number
97553A 0.20

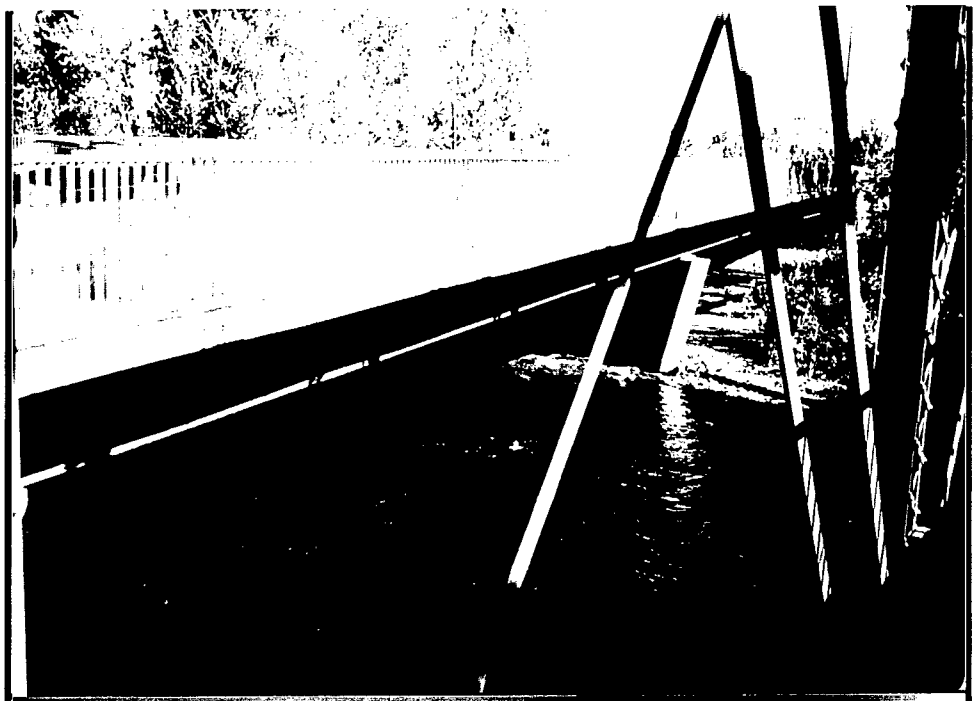

Photo No. 37
View of East Side of bridge from adjacent pedestrian bridge near South Abutment

9-6-95

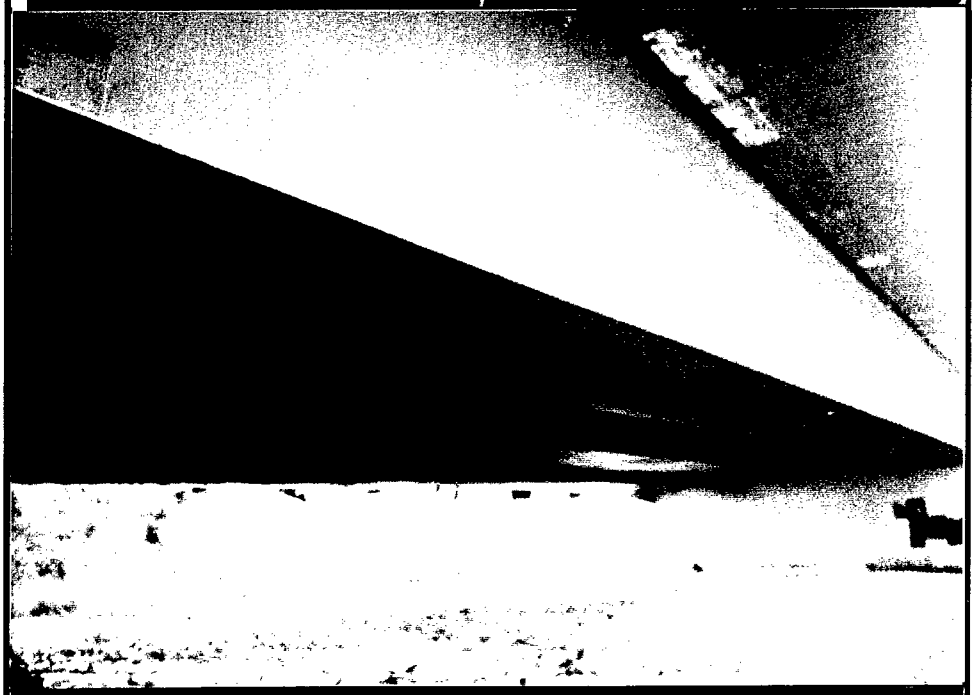

Photo No. 38
View of girders in Span 2 from West Side near North Abutment

9-6-95

Photo No. 39
Inside view of east box girder bottom flange near North Abutment. Note the field drilled drain holes.

9-6-95

Photo No. 40
Inside view of east box girder at first diaphragm from North Abutment.

9-6-95

Photo No. 41
Inside view of east box girder bottom flange near North Abutment.

9-6-95

Photo No. 42
Exterior view of drain holes in bottom flange at North Abutment.

9-6-95

VISTA UNDERPASS: The UPRR over Vista Ave. in Boise.

Description: A 105 ft. single span steel box girder in Boise, Idaho. The bridge was 10 years old at time of inspection.

Environment: The bridge is located in an urban environment with a mean annual precipitation of about 12 inches. No deicing salts are used on the bridge and estimate light to moderate use on the roadway under bridge. Clearance over the under roadway is 16 feet. Traffic under the bridge is 25,700 ADT.

Steel Surface Condition: The exterior surfaces of the box girders have a uniform dark brown oxide coating that is tightly adhered to the steel. Also the exterior surfaces are clean. The inside of the box girders were dry and clean. There is considerable mill scale on the interior steel surfaces. The oxide coating inside the boxes is light and not developing due to the dry conditions. No corrosion was found and the steel girders were in good condition. The floor system was not inspected.

Bearings: The weathering steel bearings appear to have a uniform oxide coating but were not inspected close up.

Deck Joints: There are sliding steel plates with compression seals at both abutments. The joints are covered with ballast and were not inspected. Some light staining on face of abutments indicate possible leaking.

Deck: The steel deck plate with waterproof membrane was not inspected.

Staining: No rust stains were observed on concrete faces of abutment.

APPENDIX A

Vista Underpass.
Bridge Number
97433A 9.96

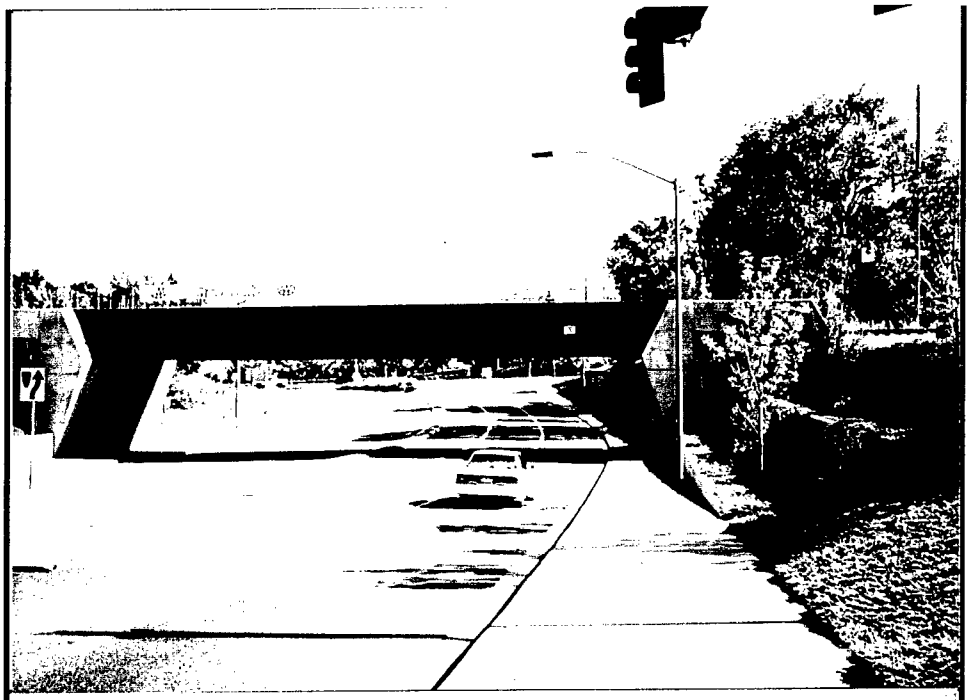

Photo No. 43
Elevation view looking north.

9-6-95

Photo No. 44
Top view looking west, showing tracks and ballast. Note the paint patches covering grafitti.

9-6-95

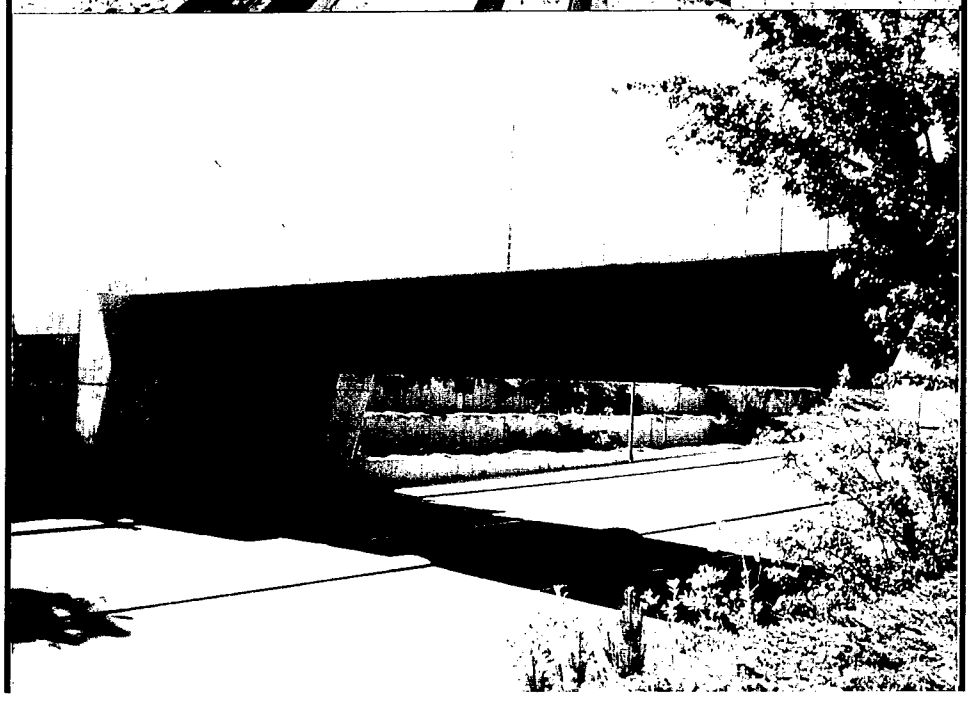

Photo No. 45
View of north girder. Note vertical stains at top flange breaks.

9-6-95

APPENDIX A

Vista Underpass.
Bridge Number
97433A 9.96

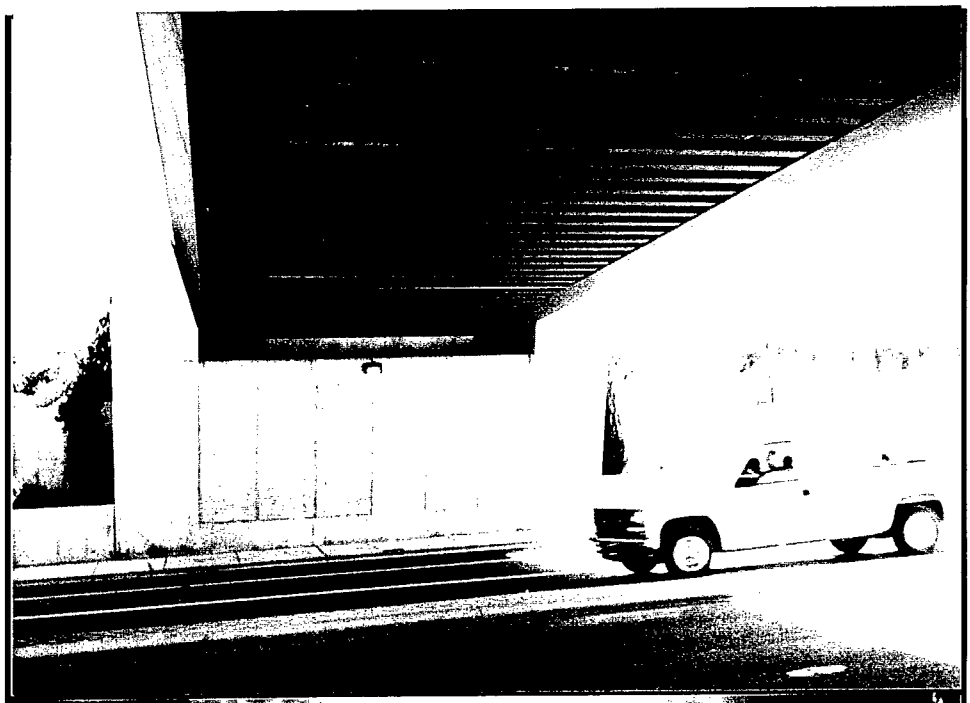

Photo No. 46
Elevation view of East Abutment and bottom of superstructure.

9-6-95

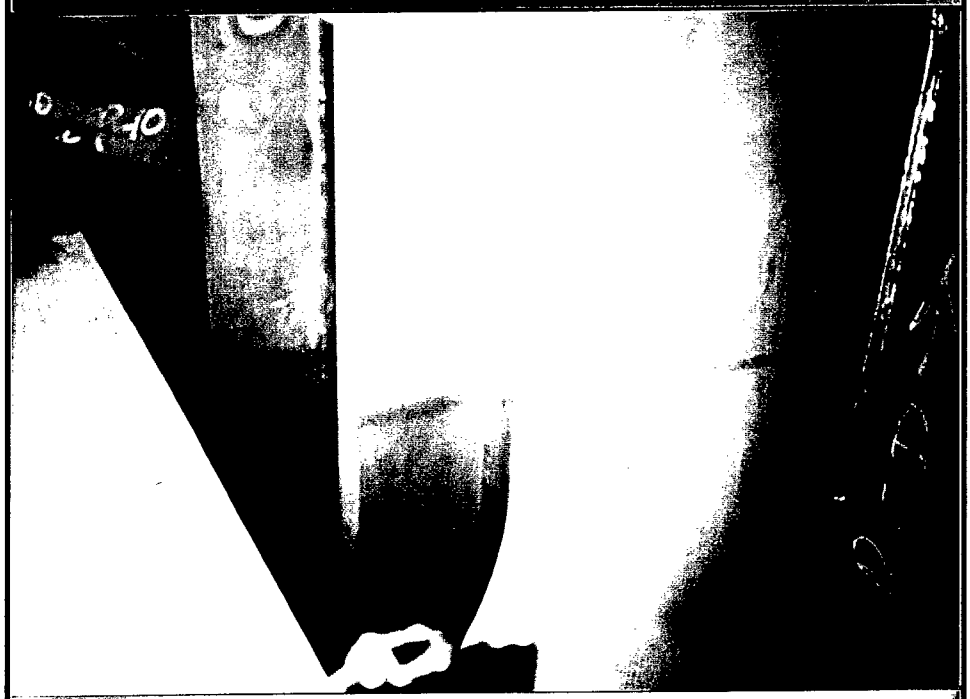

Photo No. 47
Interior of south box at East Abutment, showing web stiffeners and plate diaphragms with access hole.

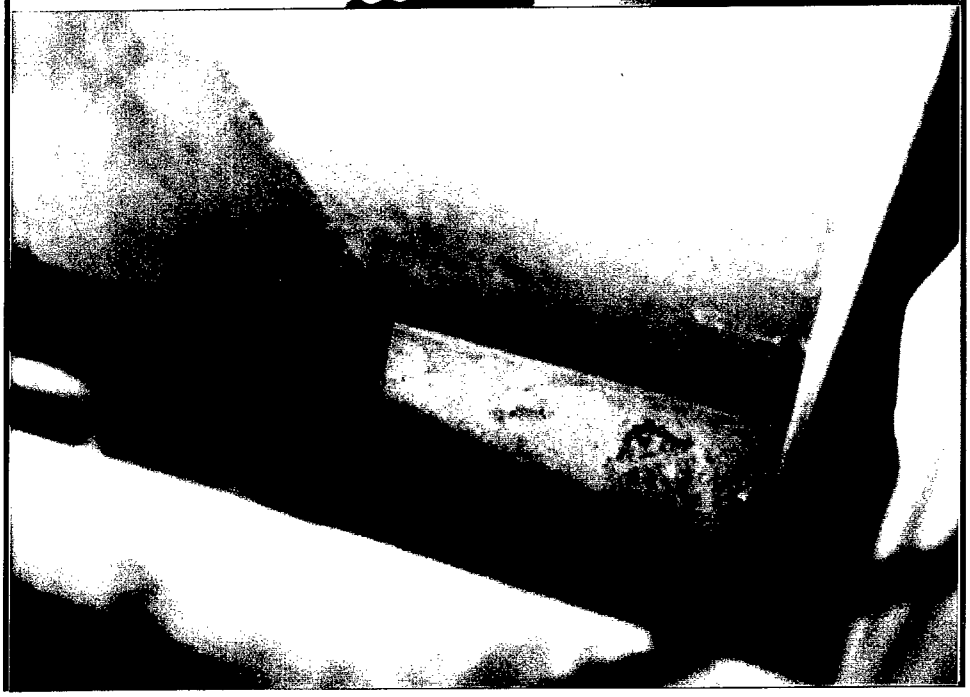

Photo No. 48
Interior of south box looking down on bottom flange.

9-6-95

GRADE SEPARATION STRUCTURE NO. 1: County road over I-84 and UPRR, 3.1 miles east of Bliss, Idaho.

Description: A 397 ft. - 3 span continuous welded plate I girder bridge that was 18 years old at time of inspection.

Environment: The bridge is located in a rural environment with a mean annual precipitation of 10 to 15 inches. Clearance over I-84 is 19.25 feet. Traffic on the bridge is 5,530 ADT and on the roadway under the bridge is 8,400 ADT. Use of deicing salts is moderate.

Steel Surface Condition: The exterior faces of exterior girders have a uniform dark brown oxide coating that is tightly adhered to the steel. The sheltered interior surfaces have some mill scale, most tightly adhered. The steel surfaces are clean. No corrosion or pitting found and the steel members are in good condition.

Bearings: The TFE-Stainless sliding bearings are functioning properly and are in good condition. There is no indication that movement is taking place between the TFE and the stainless steel surfaces at pier 2. The neoprene pads at pier 2 are distorted with one pad creeping out. All beam seats were clean.

Deck Joints: The sliding plate joints with troughs at both abutments are in good condition with no leaks observed.

Deck: The reinforced deck has some transverse hairline cracks and one small spall. The asphalt chip seal is partially worn off in the wheel tracks. A crack at a deck cold joint is leaking. Overall the deck is in good condition.

Staining: The concrete surfaces of the substructure were painted a dark reddish brown color and the slight staining is not noticeable.

APPENDIX A

Grade Separation #1
Bridge Number
08070D 143.53

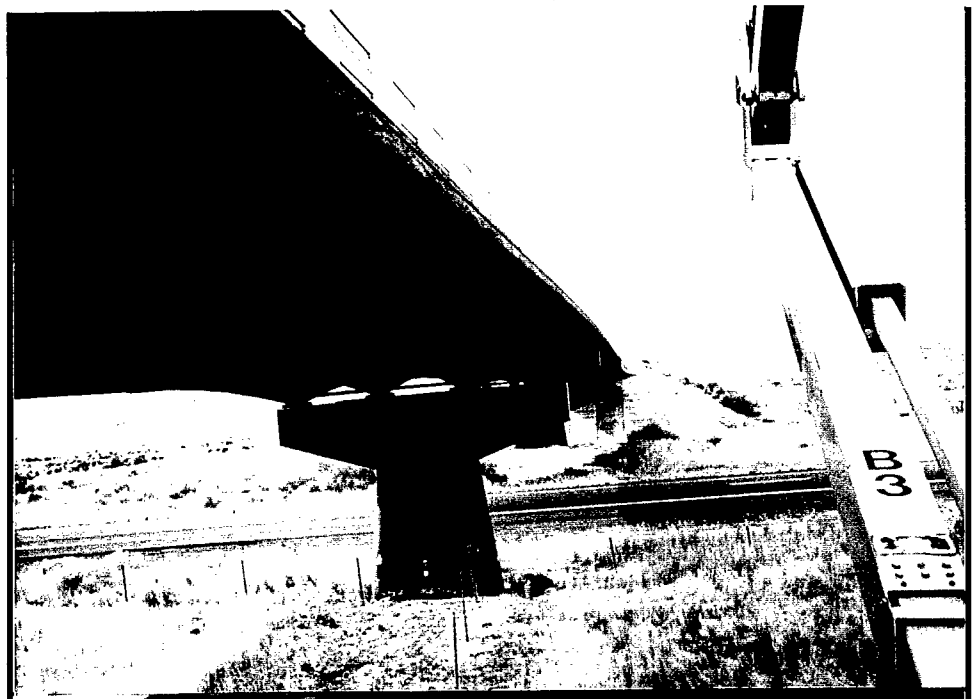

Photo No. 49
View of west girder from North Abutment

9-22-95

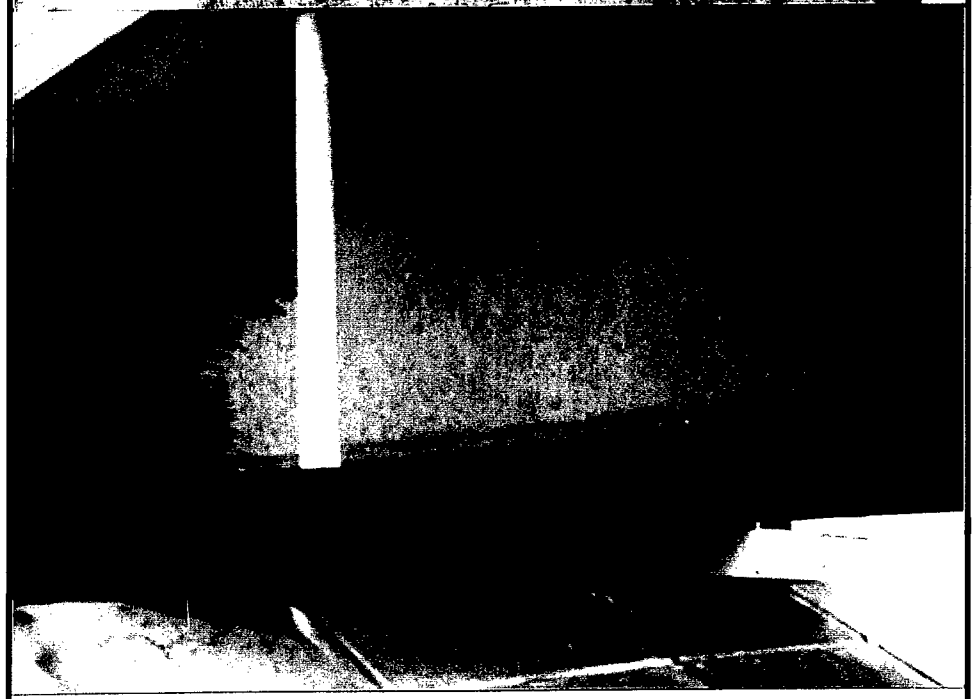

Photo No. 50
View looking at North Abutment and west exterior girder.

9-22-95

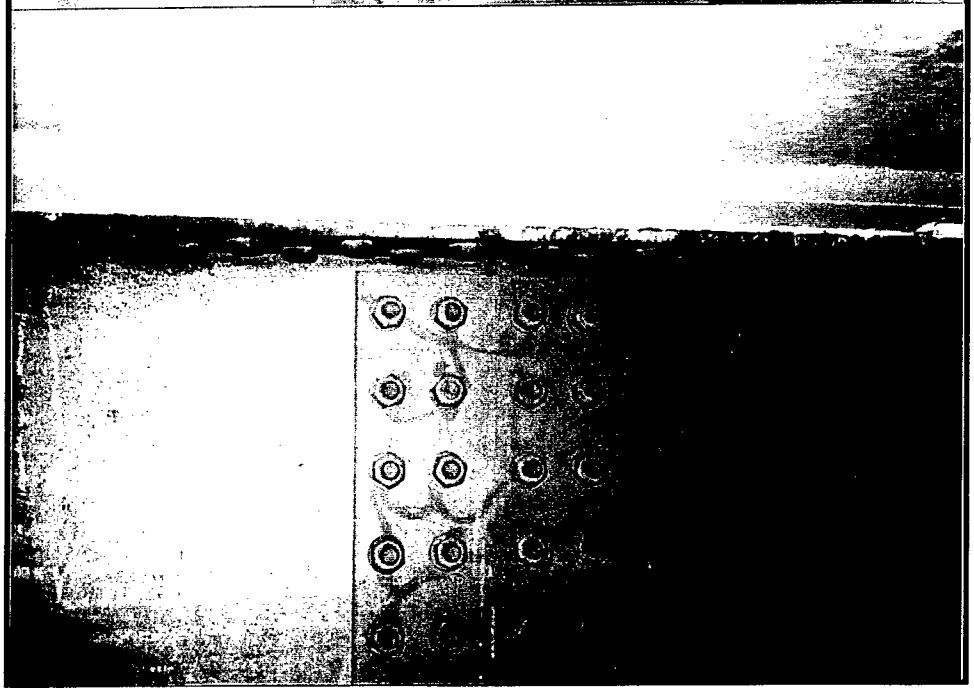

Photo No. 51
View of interior girder field splice.

9-22-95

APPENDIX A

Grade Separation #1
Bridge Number
08070D 143.53

Photo No. 52
Abutment bearing. Note painted concrete surface.

9-22-95

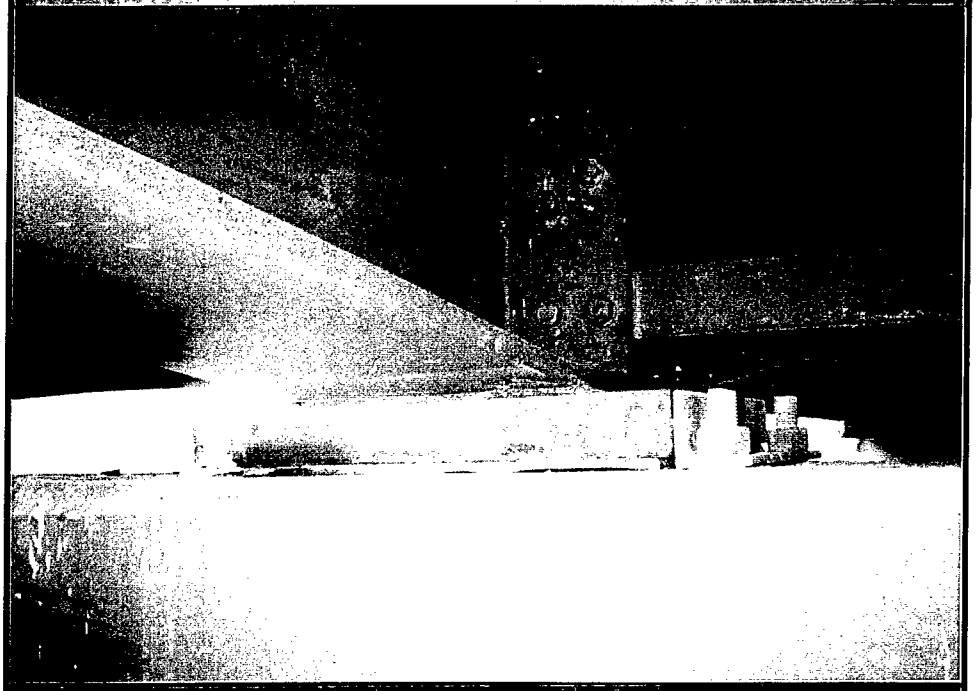

Photo No. 53
Pier bearing. Note distortions in pad.

9-22-95

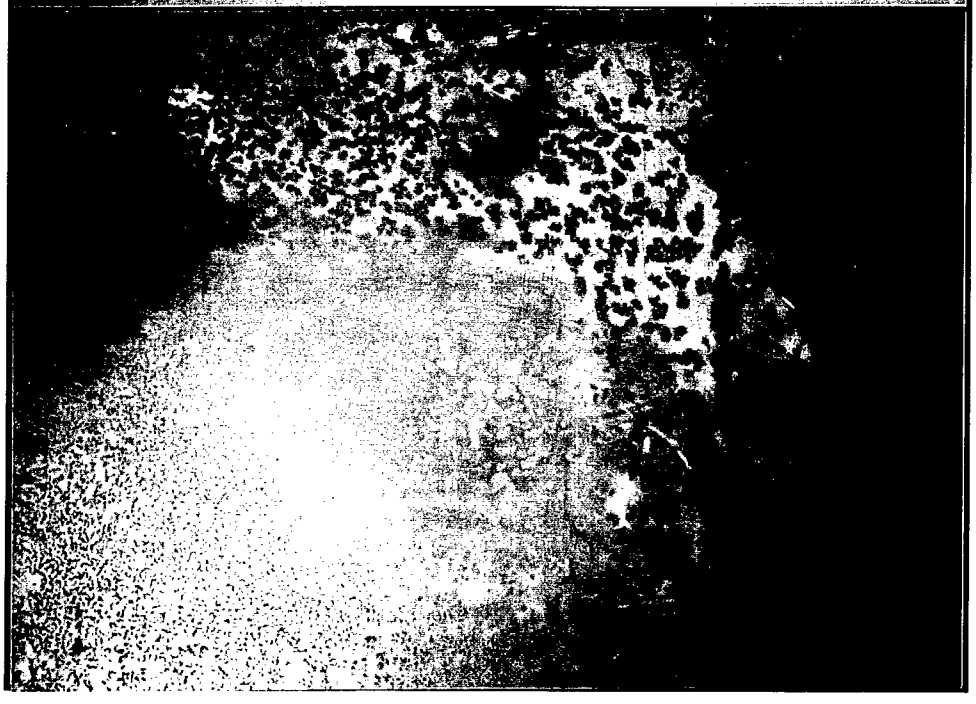

Photo No. 54
View of interior girder showing mill scale and area that was wire brushed.

9-22-95

AMERICAN FALLS BRIDGE: SH 39 SBL over Snake River, 1.1 miles west of American Falls. Idaho.

Description: A 1144 ft. - 9 span continuous welded plate I girder bridge. The bridge was 20 years old at time of inspection.

Environment: The bridge site is located in a rural environment with a mean annual precipitation of about 12 inches. Deicing salt usage on the bridge is moderate. Clearance above normal water surface is about 40 feet. Traffic on the bridge is 2,700 ADT.

Steel Surface Conditions: The exterior faces of the exterior girders have a uniform dark brown oxide coating that is tightly adhered to the steel. The mill scale on the top of the bottom flange is generally loose. There is a substantial amount of mill scale on the sheltered interior surfaces. The oxide coating on the sheltered surfaces is fairly uniform and has a medium brown color. There are numerous swallow nests on the top girder flange and on the permanent metal forms. Light corrosion was found on the bottom flange of the north girder at some of the deck drain pipes. It appears that water from the drain pipes is being blown onto the steel. A small area of laminar corrosion with possible slight loss of section is occurring on the bottom flange of the north girder at pier 4 , span 3 and is being caused by accumulation of debris and water ponding at the bearing stiffener. There appears to be corrosion at the top of a web splice near pier 6, span 5 south girder where there are several bird nests. At that same location there is rust on the metal forms indicating a possible deck leak which is likely adding to the problem. Except for the small areas of corrosion the steel members are in good condition.

Bearings: The pot bearings at piers 4 and 7 - spans 4 and 6 were recently replaced with TFE- Stainless steel sliding bearings and are in very good condition. The pot bearings at piers 5 and 6 look good. The elastomeric pads on several of the TFE-Stainless steel sliding bearings (type B bearings on plans) are deformed with no visible sign of movement at the sliding surfaces.

Deck joints: The finger joints with neoprene troughs (troughs recently replaced) at piers 4 & 7 are in good condition. The sliding steel plates joints at both abutments have troughs and appear to be in good condition.

Deck: The reinforced concrete deck has a modified latex concrete overlay. The 20 year old overlay has some delaminations, spalls and transverse cracks and is given a fair rating.

Staining: Piers 5 and 6 have dark rust stains. There are no drip plates on bottom flanges.

APPENDIX A

American Falls Br.
Bridge Number
03910A 2.62

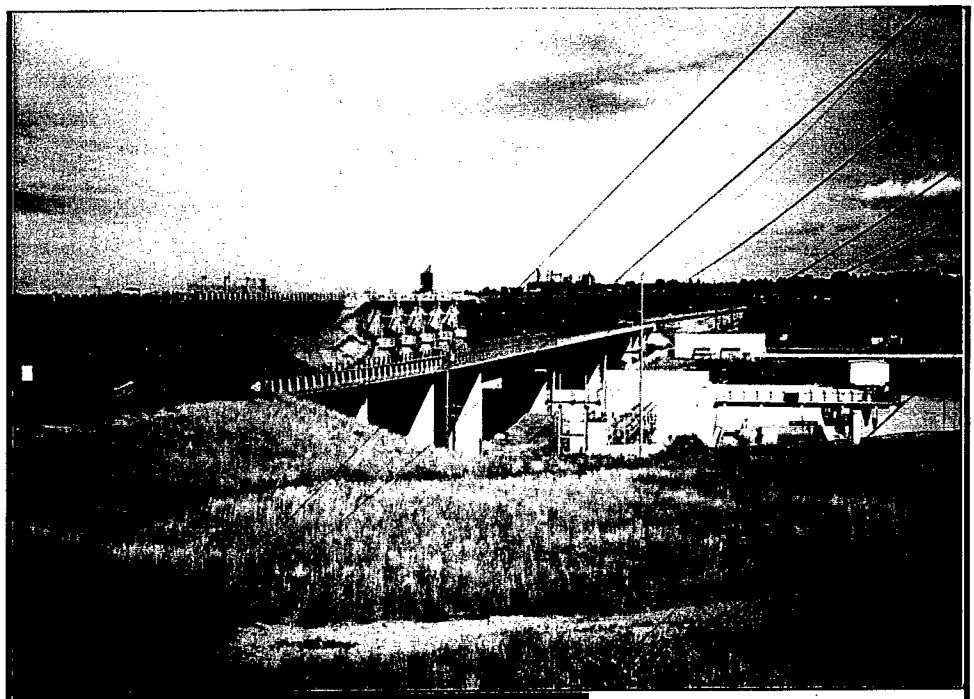

Photo No. 55
View of bridge looking east. Note dam just above bridge and power plant just below bridge.

9-27-95

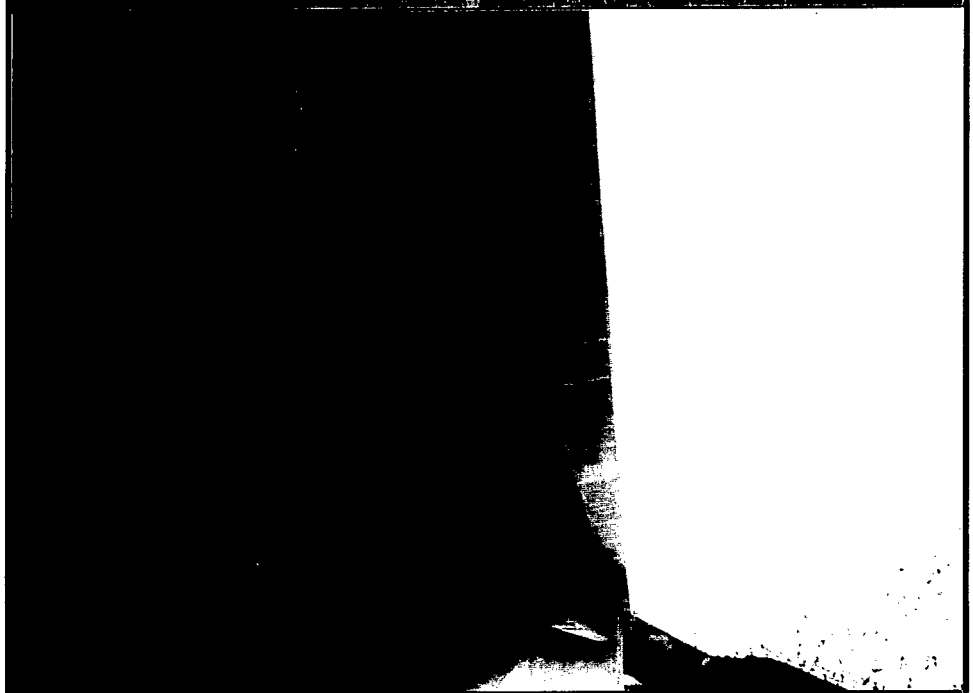

Photo No. 56
View of south main span girder looking east.

9-27-95

Photo No. 57
View of Pier 6 with dark stains showing on pier under south girder.

9-27-95

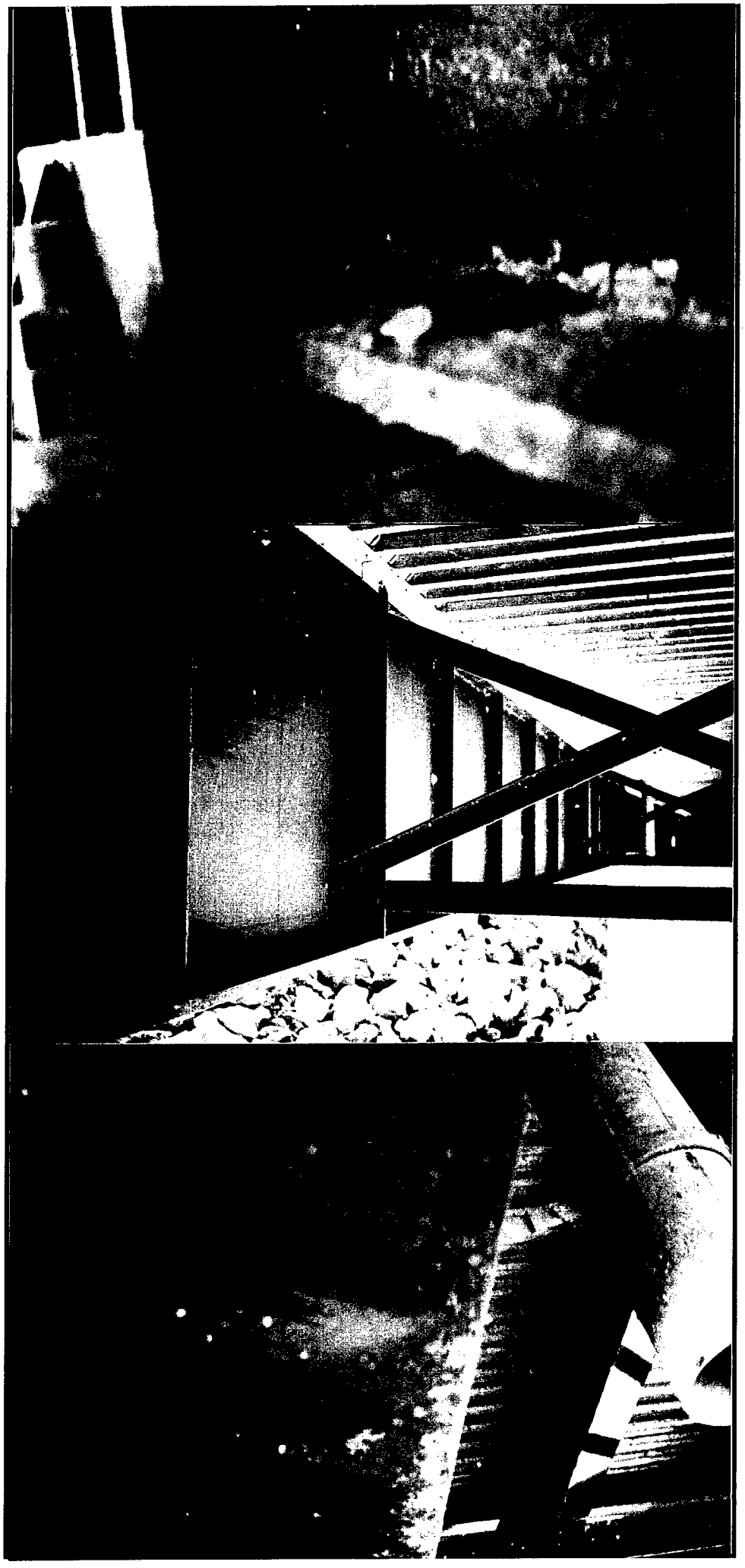

Photo No. 58
View of north girder bottom flange at Pier 4, Span 3. Note laminar corrosion on web and bottom flange.

9-27-95

Photo No. 59
Interior view of north exterior girder and cross frames at Span 3. Note the metal forms.

9-27-95

Photo No. 60
View of bottom flange of north girder of Span 5 near deck drainpipe.

9-27-95

BROADWAY BRIDGE: Broadway street over the Snake River in Idaho Falls, Idaho.

Description: A 287 ft. - 3 span bridge; span 1 is a 155 ft. simple span welded plate I girder and spans 2 and 3 are pre-stressed voided slabs. The bridge was 14 years old at time of inspection.

Environment: An urban environment with a mean annual precipitation of about 12 inches. Use of deicing salts is light. Clearance above summer water surfaces is about 6 feet. Traffic on the bridge is 21,000 ADT.

Steel Surface Conditions: The exterior faces of the exterior girders have a uniform dark brown oxide coating that is tightly adhered to the steel. The bottom girder flanges and the sheltered interior surfaces have a substancial amount of mill scale, mostly tight except on top of bottom flanges and at breaks in the mill scale. No pitting due to mill scale was observed. The steel surfaces are clean except for bird nests on bottom flanges. Corrosion was observed on steel members under the joint at pier 1 and is being caused by a leaking joint and the 3" of debris on the beam seat. The bearing plates have the most corrosion. Overall the steel members are in good condition.

Bearings: The fixed neoprene pads have some deformation but are in good condition. There are TFE-Stainless steel bearings at pier 1. The bearing at the first interior girder from south side has failed. The TFE sheet has de-bonded and is curled up. The 3" of debris was moist and is providing a corrosive condition. The beam seat, bearings and steel surfaces should be cleaned and re-inspected.

Deck Joints: The deck joints at abutment and pier 1 are armored and have compression seals. There is some sand and dirt in the joint. A splice in the seal at pier 1 a few feet from the curb is likely to be the source of the leak.

Deck: The reinforced concrete deck has an asphalt chip seal wearing surface. No spalls were observed and no cracks are showing on the underside. Deck is in excellent condition.

Staining: No rust stains on substructure were observed.

APPENDIX A

Broadway Bridge
Bridge Number
015711 6.59

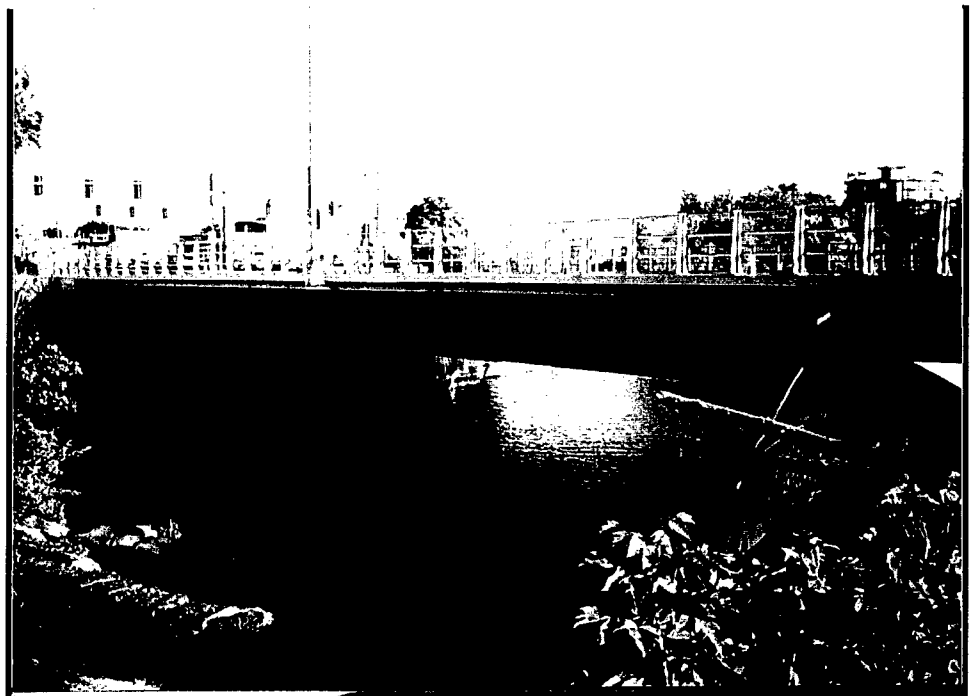

Photo No. 61
View of south side of steel span.

9-26-95

Photo No. 62
View of West Abutment from river.

9-26-95

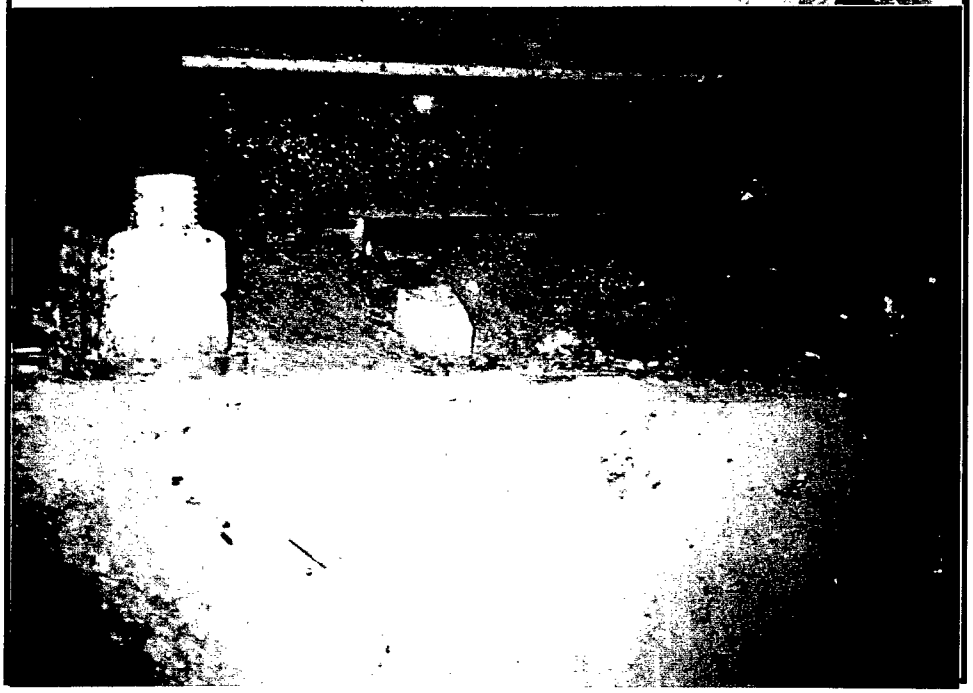

Photo No. 63
View of Pier 1 beam seat. Note large amount of dirt and debris.

9-26-95

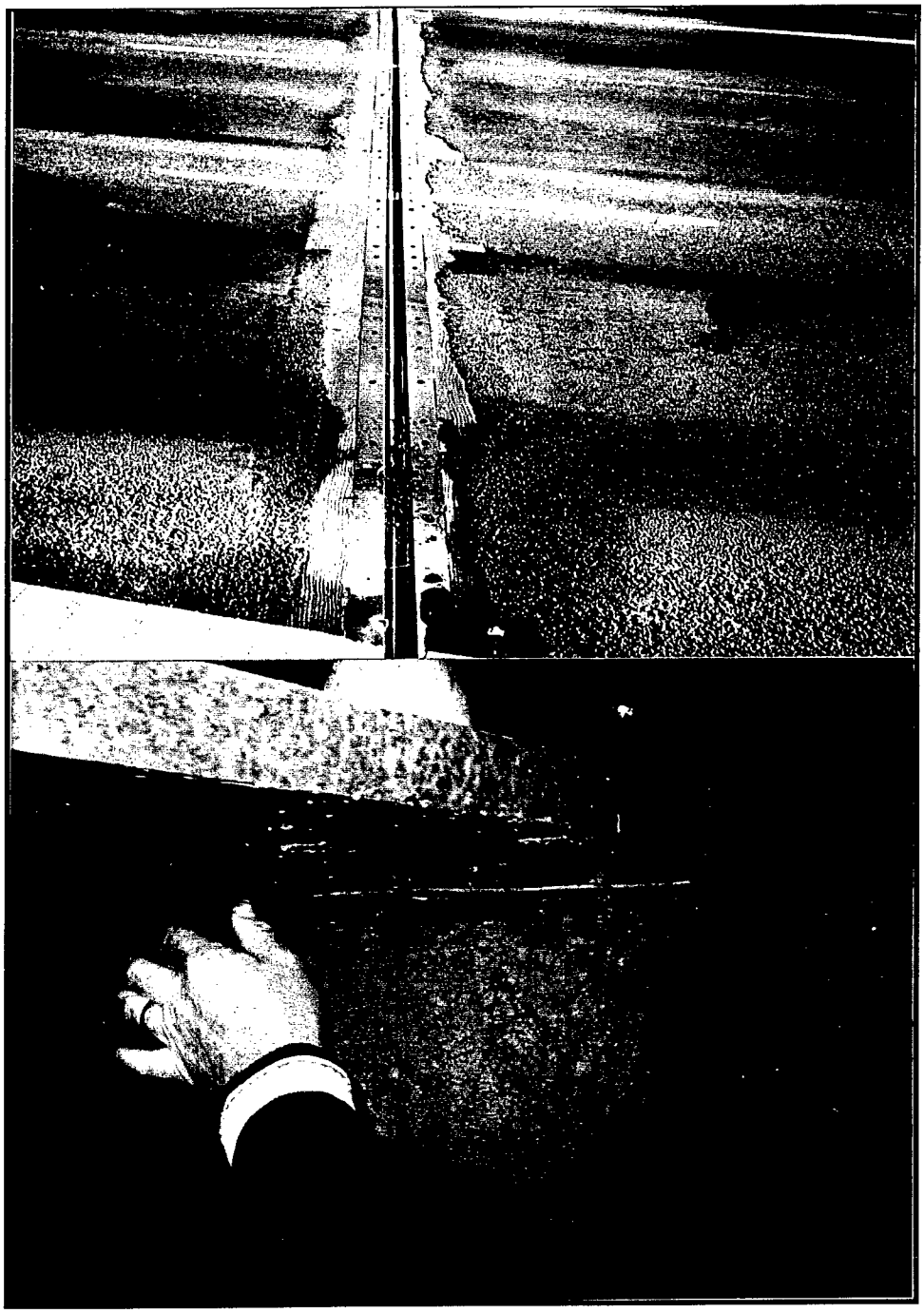

Photo No. 64
Top view of deck expansion joint at pier. Note the asphalt chip seal on the deck.

9-26-95

Photo No. 65
View of bearing on south side of first interior girder at Pier 1. Note the TFE sheet is loose and coming out.

9-26-95

TETON RIVER BRIDGE: US 20 NBL over the south fork of the Teton River 0.9 miles north of Rexburg, Idaho.

Description: A 180 ft. - 3 span continuous rolled beam bridge that was 15 years old at time of inspection.

Environment: The bridge is located in an rural environment with a mean annual precipitation of about 15 inches. Use of deicing salts on the bridge is light to medium. Traffic on the bridge is 5,800 ADT.

Steel Surface Conditions: The exterior surfaces of the exterior girders have a uniform dark brown oxide coating that is tightly adhered to the steel. The sheltered interior surfaces have a fairly uniform color with some mill scale. No pitting or corrosion was observed. The steel beams are in very good condition.

Bearings: Neoprene fixed bearings are at the piers. Pads have some distortion but are in good condition. No bearings at abutments.

Deck Joints: None

Deck: The reinforced concrete deck has random cracking on the top surface. Some hairline cracks are showing on the underside. No deck leaks or spalls were observed.

Staining: Concrete substructure surfaces are not readily visible and staining was not inspected.

APPENDIX A

Teton River Br.
Bridge Number
02020K 334.44

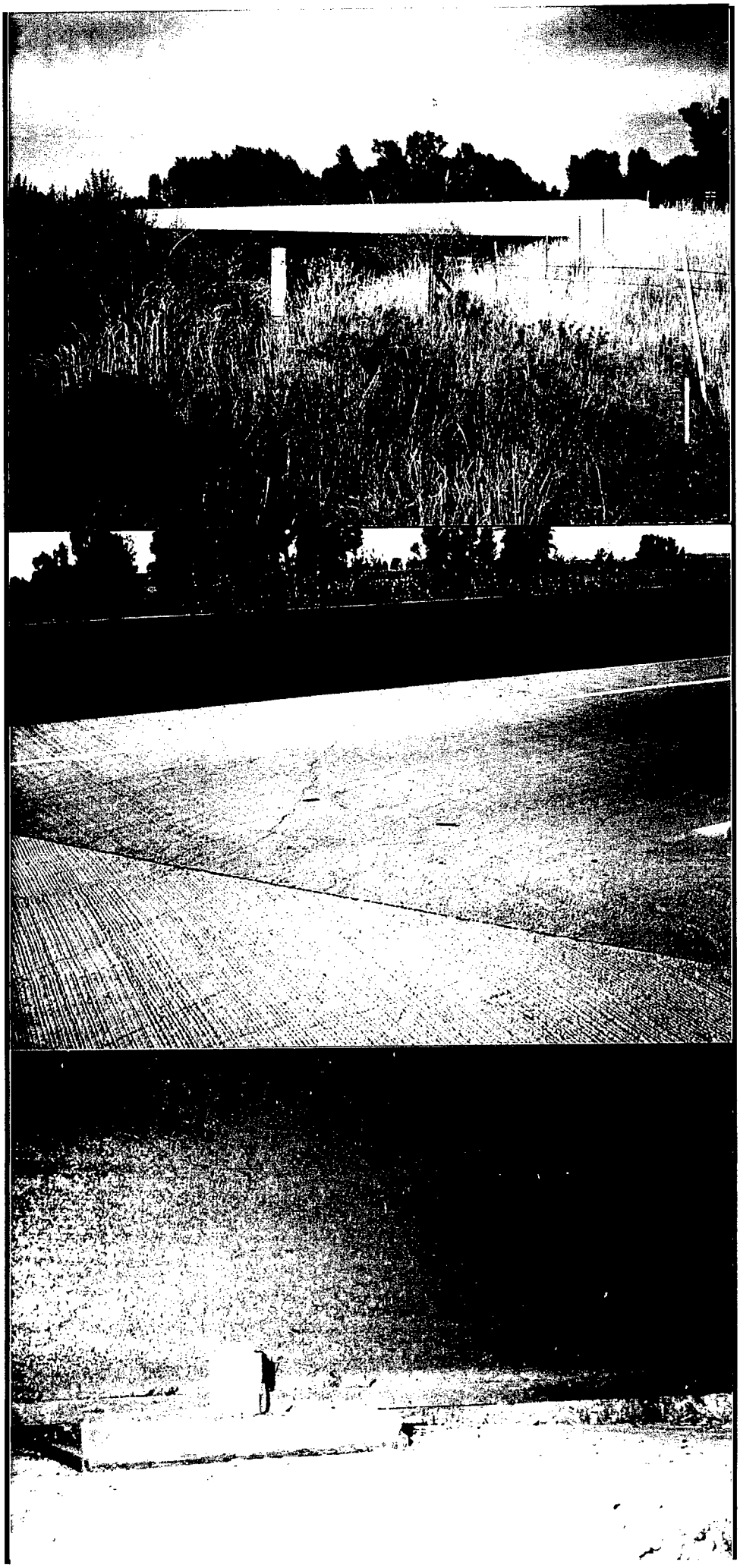

Photo No. 66
View of West Side of the bridge from the south bank.

9-25-95

Photo No. 67
View of top deck and approach slab. Note the cracks.

9-25-95

Photo No. 68
View of fixed bearing at the pier.

9-25-95

APPENDIX A

Teton River Br.
Bridge Number
02020K 334.44

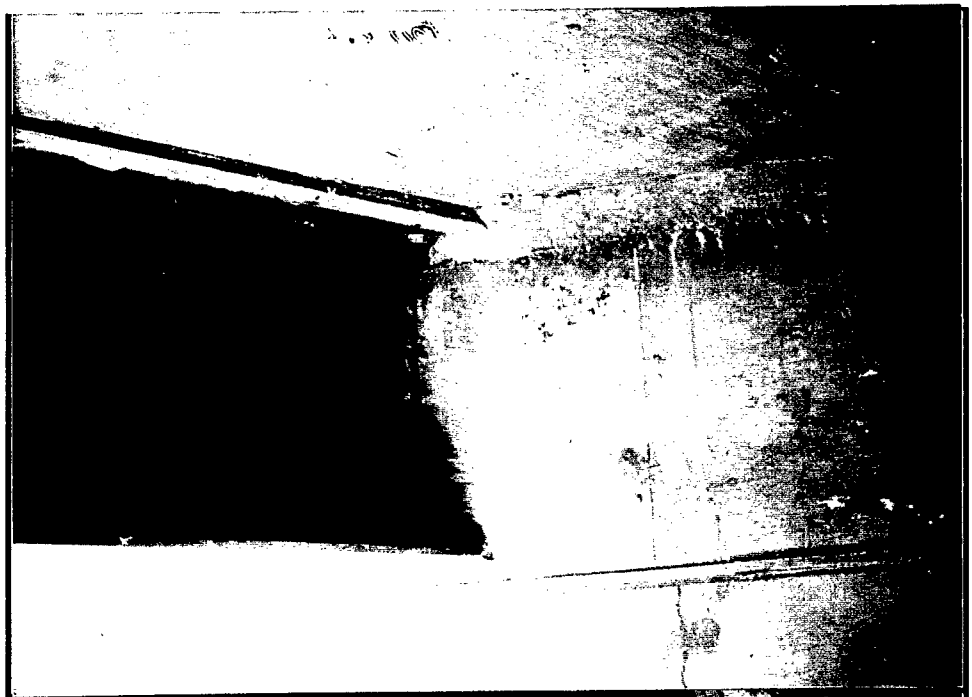

Photo No. 69
Interior view of girder at the North Abutment. Note fixed condition.

9-25-95

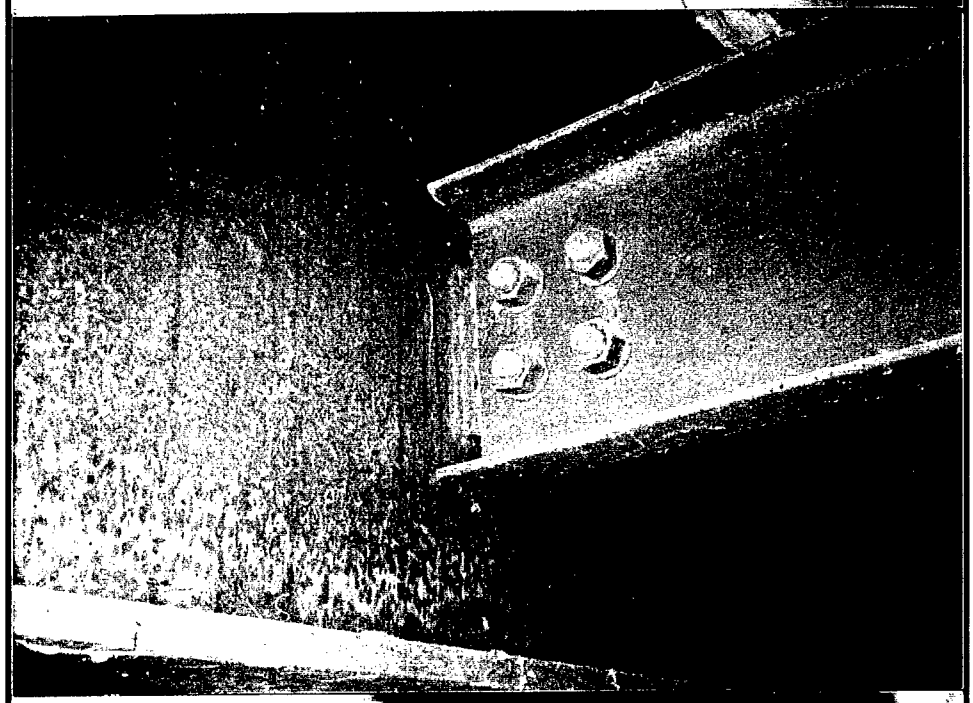

Photo No. 70
View of intermediate diaphragm connection.

9-25-95

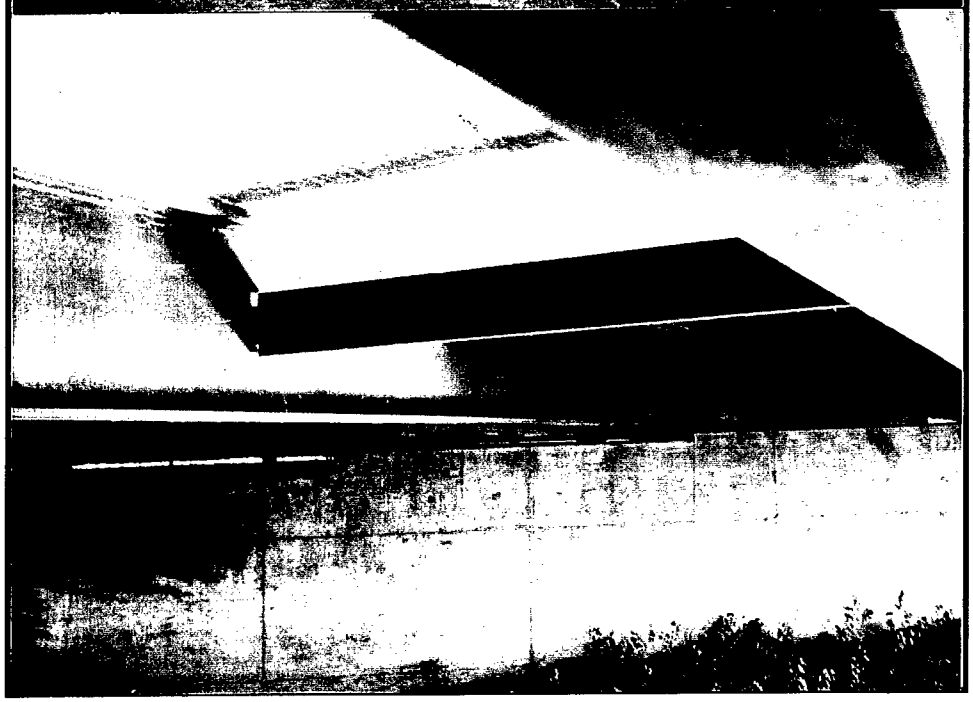

Photo No. 71
View of pier and underside of bridge.

9-25-95

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
1	15045	00220A 0.12	OldTown Bridge US 2 over Pend Oreille River - in OldTown.	U.S 2	1988	1237 ft 7 Span Cont. Welded Plate I Girder Bridge. (7 Girder section). Deck Width Varies . 67'-8" to 74'-7 5/8" Conc deck With Exp.Jts. @ Abuts.	Steel Girders have uniform rust coating over most surfaces. No excessive active rusting seen	Transverse cracks with efflorescent staining on underside	No indication Joints are leaking Modular Jt at each Abut.
1	15331	'09520G 485.58	No. Colburn Bridge US 95 over Pack River. 2.2 Miles No. of Colburn.	U.S. 95	1988	152' Single Span Welded Plate I Girder Bridge (5 Girders) Deck width 47' Strip Seal Exp. Joint @ Abutment 2 .	Weathering Steel has tight rust on ext. surfaces. No defects seen.	Transverse cracks with efflorescence on underside of deck.	Joint seal @ abut. 2 is . leaking.
1	15135	09520G 507.57	Bonners Ferry Br. U. S. 95 over Kootenai R. & R. R. In Bonners Ferry.	U.S.95	1984	1380' Cont. 10 Span Post-Tensioned Welded Plate I Girder Bridge. (4 girder section). Exp. Jts. @ Abuts.	Steel members appear in good condition. Inspected from shore with field glasses.	Transverse cracks on underside of deck w/efflor.	Exp. JT. Seals under finger jts. have failed. Joints full of gravel & debris.
1	14962	'00300A 84.19	St.Maries Bridge S.H. 3 Over the St. Maries River 0.1 Miles S. of St. Maries	S.H. 3	1977	240' 3 Span Cont. Rolled Steel I Beam Bridge. (6 Girder Section).	Light Rust on Steel Beams @ Abuts.	Small Transv. cracks in Deck. Some w/efflor. on Bot. of Deck.	Jt. Seal @ Abut 2 seems to be Leaking. Seal at Abut. 1 has Failed.
1	15311	'95711A 16.07	FAS 5711 over St. Joe River. 16.2 miles East of St. Maries Shoshone Co.	FAS 5711	1985	556' - 3 Span Cont. Welded Plate I Girder Bridge. (4 Girder Section).	Steel Members are Covered with Rust. No Major Distress found at Splice Plates.	Transv. Cracks up to 1/8" wide throughout length of Deck. Cracks Developed during Constr. Stage	Exp. Jts. @ Abuts in good Condtion.

Note: Bridges highlighted were selected for field inspection.

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
1	15453	95711A 35.05	FAS 5711 over St. Joe R. 0.75 Miles. East & 0.25 M. S. of Marble Creek. Shoshone Co.	FAS 5711	1990	420' - 3 Span Cont. Welded Plate Girder Bridge. (3 girder section).	All Steel Members are Covered with Surface Rust.	Transv. Hairline Cracks Throughout are Marked with Efflorescence.	Exp. Joints @ Abuts. filled with Gravel.
1	15188	97195A 1.63	4 th Street I. C. 4 th Street over I-90 in Coeur D' Alene.	FAM 7195 4th St.	1985	205' -2 Span Cont Welded Plate Girder Bridge. (14 Girder Section).	Steel Members in Good Condition. No Deterioration.	Transv. Hairline to 1/32" Cracks with Efflorescence.	Exp. Jts. at Abuts. Neoprene Jt. Seal with some Leaking.
1	13813	X995050 0.74	St. Joe Bridge. Co. Rd. Plng # 0067 over St. Joe River. 1.0 M N & 10.0 M E. of St. Maries.	Co. Rd.	1979	236' - Single Span Steel I Girder Br. Girders Haunched (3 Girder Section.)	Steel Girders in Good Condition. No Signs of Distress	Deck- No Cracks.	Jts. @ Abuts. Filled with road. Material.
1	12599	995090 475.45	BN RR over US 95 N. Sandpoint U.P. Sandpoint N. City Limits.	BN RR	1973	997' - Steel Bridge. Simple Span Through Welded Plate I Girder. 2 Through Girders with Rolled Beam Floor System over Hwy. 95.	All Steel Members Have Tight Rust. Scrapes on Bottom Flange from High Loads.	Conc. Deck Slab w/Diced Rock Ballast. No Defects seen from underside	N/A
1	14594	995090 476.02	Ponderay U. P. S. I. RR over US 95 Ponderay NWCL	S I. RR	1973	212' - Dual Bridges. Simple 2 Span Welded Plate I Girders . 2 Through Girders with Rolled Steel Bms. & Steel Deck Plate Floor System.	All Steel has Tight Surface Rust. No Defects Seen.	Deck Ballast Plate has Tight Surface Rust.	N/A
2	14958	01310A 26.17	Kooskia Bridge SH 13 over Middle Fork Clearwater R. Kooskia NWCL	SH 13	1994	576' - 3 Span Cont. Welded Plate I Girder. (5 Girder Section).	No Problems Evident with Steel Members.	Deck In Span 1 Has Transv. Cracks @ abt. 3' ctrs. Sspans 2 & 3 are OK.	Jts. @ Abuts. No Problems Evident.

Note: Bridges highlighted were selected for field inspection.

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
2	15216	1410A 8.68	Golden Bridge. SH 14 over the S. Fk Clearwater R. 8.7 miles S.0f Jct. SH 13 & 14.	SH 14	1985	137' - Single Span Welded Steel Plate I Girder Bridge. (4- Girder Section.)	Steel Girders & X Members Appear to be in Good Cond.	Deck - No Distress - Top or Bottom.	Exp. Jt. @ Abut. 2 Seal @ sides is Loose & Leaks on Abut.
2	15380	9520D 267.44	Lawyers Canyon Br. US 95 over Lawyers Cr. & Canyon. 5.0. Miles South of Craigmont.	US 95	1991	919' -4 Span Cont. Welded Plate I Girder Bridge. (4 Girder Section).	Steel Girders & X-Frames in Good Condition. No Distress Evident.	Deck has Random Transv.Cracking. Cracks are @ 3-4' intervals . Cracks have been Sealed.	Modular Joints at Abuts. in good Condition.
2	N/A	X994180 4.17	Grandad Bridge. Co. Rd. Plng # 0063 over N . Fk. Clear-water River. 2.4 M. N. & 12.3 M. E. of Elk River.	Co. Rd.	1971	1208' - 3 Span Cont. Deck Truss with an Approach Span @ each End.	Truss members, Floor Beams & Stringers in Good Condition. Rust Coating Stabilized.	Deck in Good Condition with a few Transv. Sh. Cracks.	Comp. Seal in Good Cond. Steel Finger Jts. have Considerable moss Growing & Debris Collected in Jts.
3	15007	08400B 0.89	N.W. Caldwell I. C. N. W. Connector over I- 84. In Caldwell.	I- 84B	1983	227' - 3 Span Cont. Steel Box Girder Bridge. (4 Girder Section). The Short End Spans are Hidden and have Tiedowns @ Free ends.	No Distressed Members evident. Steel X-Frames @ Piers in Good Condition.	Deck has Asphalt W. S. Bottom of deck overhang has minor Transv.Cracks with Efflorescence	Exp. Jt system collects Debris & water. Also there is a pounding noise from Traffic
3	14912	08070C 121.60	I-84 EBL over U.P. RR & Snake River. 1.0 M. E of Glenns Ferry.	I-84 EBL	1974	1122' - 7 Span Welded Plate I-Girder Bridge. 2-3 Span Cont. Units & 1-Simple span. (2 Girder Br. with Floor Beams and Stringers.)	Fatique Cracks from out-of-plane Bend-Found in RR spans Repairs made. Steel members in Good Condition.	Seal Coat W. S. Overhang has Numerous Transv. H.L. Cracks w/Efflor.	Finger Jts. @ Piers 3 & 6 With Trough seal under fingers. Some Wear at P. 3.

Note: Bridges highlighted were selected for field inspection.

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
3	14912	08070C 121.61	I-84 WBL over U.P. RR & Snake River 1.0 M. E of Glenns Ferry.	I-84 WBL	1974	1094' - 7 Span Welded Plate I-Girder Bridge. 2-3 Span Cont. Units & 1-Simple Span. (2 Girder Br. with Floor Bm. & Stringers.)	Fatique Cracks from out-of-plane bending found in RR spans. Repairs made. Steel members in good condition.	Seal Coat W. S. Overhang has Numerous Transv. H.L. Cracks w/Efflor.	Exp.Finger Jts. @ Piers'3 & 6 in good condition.
3	14913	08070C 127.96	I-84 EBL Over Snake River. 7.4 M. East of Glenns Ferry.	I-84 EBL	1974	998'- 5 Span Welded Plate I-Girder Bridge.1-3 Span Cont. Unit. & 1-Simple Span each end. (2 Girder Br. with 'Floor Bms. & Stringers.) Rocker Brgs. Replaced With Sliding Brgs.	Steel Members In Good Condition. Some loose Bolts Found. No Fatigue Cracks.	Seal Coat W. S. Overhang has Some Transv. Hair-Line. Cracks w/Efflor.	Finger Jts. - West Jt. has 2 Bolts & East Jt. has 8 Bolts Missing.
3	14913	08070C 127.97	I-84 WBL Over Snake River. 7.4 M. East of Glenns Ferry.	I-84 WBL	1974	998'- 5 Span Welded Plate I-Girder Bridge.1-3 Span Cont. Unit. & 1-Simple Span each end. (2 Girder Br. with 'Floor Bms. & Stringers.) Rocker Brgs. Replaced With Sliding Brgs.	Steel Members In Good Condition. Some loose Bolts Found. No Fatigue Cracks.	Seal Coat W. S. Overhang has Some Transv. Hair-Line. Cracks w/Efflor.	Finger Jts. Connection Bolts Missing
3	14950	08071B 1.72	E. Glenns Ferry I. C. First Ave. over I-84 In Glenns Ferry.	I-84B 1st Ave.	1976	283' Two Span Cont. Welded Plate I Girder Br. (5 Girder Section).	No Defects Seen. Steel Members in Good Condition.	Seal Coat W. S. Bottom of deck has Hairline Cracks With Effloresconce.	Steel Sliding Exp. Jts. with Neoprene Sheet Seal.
3	14974	09520C 171.91	Black Bear Br. U.S. 95 over Little Salmon R. 10.8 M. N. of New Meadows.	U.S. 95	1975	168'- Single Span Welded Plate I Girder Br. (5 Girder Section).	No Defects Seen. Steel Members In Good Condition.	Asphalt W. S. In Poor Condition. Deck has Cracks with Effloresconce.	Neoprene Jt. Seals with Armor. Seal @ Abut. 1 failed and Leaks.

Note: Bridges highlighted were selected for field inspection

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
3	15244	97553A 0.20	South 9th St. over Boise River. In Boise, Ada Co.	F 7553 S. 9th St.	1987	299' - Two Span Cont. Steel Box Girder Br. (3 Girder Section).	Steel Box Girders in Good Condition	Numerous Transv. Cracks. Conc. deck in Good Condition.	Exp. Jts at both Abuts. in Good Condition.
3	15089	97433A 9.96	U.P. RR over Vista Ave. In Boise.	U.P. RR	1985	105' Single Span Steel Box Girder Br. (2 Girder Section). Ballast on Steel Deck Plate.	Steel Box Girders Appear to be in Good Condition. Broken Welds on Ballast Plate.Loose bolts conn. ballast plates.	N/A	N/A
3	15192	X993010 14.56	Maple Grove G. S. Maple Grove Rd. over I-84. 4.4 M. West of Boise.	Maple Grove Rd.	1989	349' - Two Span Cont. welded Plate 'I Girder Br. (7 Girder section).	No Distress evident Steel Members in Good Condition.	Seal Coat W. S. Minor H/L Cracking on Top Ssurface.	2" Strip Seal Exp. Jts. filled with Dirt & Debris - other-wise in Good Cond
3	14740	993200 128.46	King Hill RR U.P. UPRR over I-84 7.9 Miles of Glenns Ferry.	UPRR Plng #111E	1974	222' Two simple Spans - Welded Plate I 'Girder Br. (6 - Girder section)	Steel Girders in Good Condition.	Steel Deck Plate W/ Ballast under Tracks Conc. Deck on Service Rd.	Metal Sliding Plate & Rubber Seal on Service Rd. Good Condition.
4	14653	08070D 146.11	I-84 EBL over Malad R. Gorge. 5.6 Miles East of Bliss.	I-84 EBL	1975	198' Sing;e Span Welded Plate I Girder Br. (2 Girder with Floor Bm. and Stringers).	Girders, Floor Bms. and Stringers in Good Condition.	Seal Coat W. S. Overhang shows Transv. Hairline Cracks with light. Effloresconce.	Sliding Plate Exp. Jt with Neoprene Trough.
4	14653	08070D 146.13	I-84 WBL over Malad R. Gorge. 5.6 Miles East of Bliss.	I-84 WBL	1975	228' Sing;e Span Welded Plate I Girder Br. (2 Girder with Floor Bm. and Stringers).	Girders, Floor Bms. and Stringers in Fair Condition.	Seal Coat W. S. Overhang shows Transv. Hairline Cracks with light. Effloresconce.	Sliding Plate Exp. Jt with Neoprene Trough.Sliding plates loose @ Both Jts.

Note: Bridges highlighted were selected for field inspection.

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
4	14720	None	Pedestrian Bridge over Malad River Gorge. 5.6 miles East of Bliss.	None	1975	212' Steel I Girder Pedestrian Bridge. Two Through Girders with Steel Deck Plate. 12'-6" end spans and 185' main Span. Tie downs at Abutments.	N/A	N/A	N/A
4	14718	09320B 50.02	Perrine Bridge U.S. 93 over Snake River. 0,6 Miles N. of Twin Falls.	U.S. 93	1976	1500' Steel Truss Deck Arch With 2 Cont. 'Steel I Girder Approach Spans at 'Each End.. The Approach Spans Consist of 4- I Girders with Floor Bms. & Stringers. The Arch Chords, Spandrel Columns, & Floor Bms. @ O &O` are Box Sections.	The Floor Bms. @ O & O` had active corrosion inside the Box Sections. The Box columns @ O & O` had water in the botton of the box sections causing active corrision. See Burgess & Niple Report for 'Details. REPAIRS HAVE BEEN MADE.	Seal Coat W.S. Hairline cracks visible top & bottom on sidwalk. W/efflor. stains on underside. SIP metal Forms in good condition.	The open finger Jts.were replaced With Modular Jts. in 1994.
4	15083	92744A 2.73	Murtaugh Br. FAS 2744 over Snake R. 0.5 M. West 0.5 M. East of Murtaugh.	FAS 2744	1983	289' - 2 Span Cont. Welded Steel Plate I Girder Br. (4 -Girder section)	Steel Girders in Excellent condition.	Minor Transv. Hair-line Cracks.	Jts. in good cond. sand accumulation in Jts.
4	14651	08070D 143.53	G.S. # 1 Co. Rd. over I-84 & UPRR 3.1 M. East of Bliss.	Co. Rd.	1977	397' - 3 Span Cont. Welded Plate I Girder Br. (4 - girder section).	Steel Members in Good condition.	Chip Seal W. S. Top Deck has hair-line transv. cracks in Negitive Mom. Area Cracks visible from underside W/Efflores	Sliding metal plates @ Abuts. with neoprene trough. Good Condition.

Note: Bridges highlighted were selected for field inspection.

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
5	15415	01561A 10.96	American Falls North O.P. I-86B over UPRR. 0.7 Miles North of Am. Falls.	I-86B	1992	414' - 3 Span Curved Cont. Welded Plate I Girder Br. (4 - girder section).	Steel Members in Good Condition.	Hairline to 1/16" Transv. cracks. Some have efflores. stains on bottom.	Jts. Armored with neoprene seal @ Abuts. Good Cond.
5	12562	03910A 2.62	SBL SH 39 over Snake River. 1.1 Miles W. of American Falls.	SH 39 SBL	1975	1144' - 9 Span Cont. Welded Plate I Girder Br. Approach Spans 1,2 & 3 & 7, 8 & 9 are Multi-Girder, Spans 4, 5 & 6 are a Two Girder System with Floor Beams & Stringers. PROJECT UNDER CONTRACT TO FIX WELD CRACKS , JOINTS & REPLACE BEARINGS.	Two small cracks found in weld on floor bm. connection Some loose conn. bolts found.	Latex overlay has numerous transv. cracks & areas of delamination. (6%) H.L. transv.cracks w/effloresesconce in overhang	Sliding Metal plate exp. jt. W/neoprene trough needs to be replaced.
5	15060	01560A 28.09	Massacre Rocks I.C. Mass.Rocks Rd. over I-86 . 10.9 M. West of Am. Falls.	M. R. Rd.	1985	261' Two Span Cont. Welded Plate I Girder Bridge. (5 - beam section).	Steel Members in Good condition. Abut. Bearing need to be repaired and re-positioned.	Chip Seal W.S. Transv. hairline cracks w/effloresc. on deck bottom. Cracks visable on top of deck.	Comp. Seal Exp . Jts. appear to be OK
6	15041	015711 6.59	Broadway Br. Broadway St. over Snake R. In Idaho Falls.	I-15B Broadway St.	1981	287' - 3 Span Bridge. Spans 2 & 3 are pre-stressed voided slabs. Span 1 is a simple span welded plate I Girder. (12 girder section).	Girders in good Condition. Some minor scaling on tops of bott. flange.	Deck on Steel span in good condition, some minor cracking	Exp. Jts. in good condition.
6	14968	02020K 321.32	Ribgy G.S. U S 20B over SH 48 in Rigby	U S- 20B	1976	147' - 3 Span cont. welded stee; plate I girder Br. Cantilever end spans. (11 girder section).	Steel girders in very good condition.	Conc. deck W/ Galv. Rebars. Some minor cracking over entire deck .	None

Note: Bridges highlighted were selected for field inspection.

APPENDIX B
IDAHO TRANSPORTATION DEPARTMENT
UNCOATED WEATHERING STEEL BRIDGES

District	Drawing No.	Structure Number	Bridge Name Features & Location	Route	Year Built	Structure Type Description	Comments Taken From Previous Bridge Inspection Reports		
							Steel Members	Deck	Exp. Jts.
6	13809	02020K 334.44	SBL US 20 over So. Fk Teton River 0.9 Miles North of Rexburg.	US 20 SBL	1980	180' - 3 Span Cont. Rolled steel beam Br.' (multi-girder section)	Rolled Beams in good condition.	Several transverse cracks that go through deck. Some minor leaking.	Preformed Jt. seal in good condition
6	13809	02020K 334.45	NBL US 20 over So. Fk Teton River 0.9 Miles North of Rexburg.	US 20 NBL	1980	180' - 3 Span Cont. Rolled steel beam. Br.' (5 - girder section).	Rolled Beams in good condition.	Several transverse cracks that go through deck. Some minor leaking.	Preformed Jt. seal in good condition.
6	15470	04810A 0.01	Roberts I. C. SH 48 over I-15 Near Roberts	SH-48	1994	264' - 4 Span cont. welded Plate I Girder Br. (4 girder section).	Steel Members in good condition.	Epoxy coated reinf. Conc. Deck. SIP metal forms . Deck in good condition.	None
6	15104	02020K 336.85	Salem Rd. I. C. Salem Rd. over US 20. 2.0 Miles No. Rexburg.	FAS 6770 Salem Rd.	1982	268' - Two Span Cont. Welded Plate I Girder Br. (6 Girder section).	Steel Members in Good condition.	Seal Coat W. S. Has a few hairline cracks Photos show Transv cracking W/Effloresc Deck in good Cond.	Preformed Jt. Seal has some wear, but doing well.

Note: Bridges highlighted were selected for field inspection

APPENDIX C

CHLORIDE TEST RESULTS ON RUST SAMPLES FROM BRIDGES

Bridge Number	Bridge Name	Location where Sample was Taken	Lab. No.	Test Results in PPM
08070C 121.61	I-84 WBL over Snake R. & UPRR	Ext. face of web of north girder 4'-6" from west end of girder at west abut.	95-E569	370
97553A 0.20	Ninth St. over Boise River	Top of bottom flange (inside box) east girder. 1'-9" from web & 9' from abut.# 2	95-E570	600
97433A 9.96	UPRR over Vista Ave.	RR face of north girder web, 25' from west end & 9" above top of curb	95-E571	99
97195A 1.63	Fourth St. over I-90	East ext. girder, ext. face of web and bearing stiffener at south abutment	95-E572	280
09520G 507.57	Bonners Ferry Br. US-95 over Kootenai R.	East int. girder web and top flange, 10" from bearing stiffener at north abut.	95-E573	51
995090 476.02	Ponderay UP Bridge over US 95	Bottom of deck plate at abutment # 1	95-E574	< 5
00300A 84.19	St. Maries Br. SH 3 over St. Maries R.	End diaphragm at abutment #2	95-E575	< 5
02020K 344.44	US 20 SBL over So. Fk. of Teton River	Ext. face of east and west ext. beam near abutment #1.	95-E576	160
01571I 6.59	Broadway St. over Snake River	First interior girder south side, web plate, 24" out from west abut.	95-E577	380
03910A 2.62	SH 39 SBL over Snake River	Int. face of web, 8" above bottom flange 12' from pier # 5 in span # 5.	95-E578	1260
03910A 2.62	SH 39 SBL over Snake River	Bottom of bottom flange of north girder at drain pipe span # 5 near mid-span	95-E579	3170

APPENDIX C

IDAHO TRANSPORTION DEPARTMENT
SALT /SAND MIX USE

DIST	BRIDGE NAME	ROUTE #	BEGIN MILE-POST	END MILE-POST	SAND/SALT USED FY91 (CU. YD.)	SAND/SALT USED FY92 (CU. YD.)	SAND/SALT USED FY93 (CU. YD.)	SAND/SALT USED FY94 (CU. YD.)	SAND/SALT USED FY95 (CU. YD.)	AVERAGE SAND/ SALT USE (CU. YD.)
1	Bonners Ferry Br. US 95 over Kootenai R.	001540	507.56	507.78	23.5	20.6	29.4	24.4	27.6	25.1
1	St. Maries Br. SH 3 over St. Maries R.	001800	84.19	84.24	0.1	0.2	0.8	1.3	1.6	0.8
1	Ponderay UP SIRR over US 95	001540	475.52	476.52	115.7	62.3	103.3	84.9	84.8	90.2
3	I-84 WBL over Snake River near Glenns Ferry	001010	121.53	121.74	5.3	0.4	16.3	7.4	2.5	6.4
3	N.W. Caldwell I.C. N.W. Conn. over I-84	004635	0.89	0.92	0.0	0.0	0.0	0.0	0.0	0.0
4	G.S. #1 Co. Rd. over I 84 & UPRR.	001010	142.97	143.97	25.5	2.3	59.1	27.8	21.0	27.1
5	SBL-SH 39 over Snake River Near Am. Falls.	002330	2.25	2.46	3.3	3.1	6.2	5.5	9.2	5.5
6	Broadway St. over Snake R. in Idaho Falls	001380	6.59	6.65	0.0	0.0	0.2	0.1	0.0	0.1
6	SBL US 20 over So. Fork Teton River.	002070	334.35	334.38	0.1	0.1	0.3	0.5	0.9	0.4

The data shown in the above table was obtained from ITD's Maintenance Management System (MMS). The figures are the average cubic yards of salt/sand mix used on a roadway segment in the vicinity of the bridge. The length of the segment is the distance between begin and end mileposts and except for the Ponderay Underpass and G.S. #1 is the same length as the bridge. A one mile segment was used for the highway passing under the Ponderay Underpass and G.S. # 1.

Note: The data available in the MMS does not contain sufficient detail to differentiate salt/sand usage between bridges and the adjacent roadway.

APPENDIX D

MEASURING STEEL PLATE THICKNESSES

Plate thickness measurements were taken on 9 bridges to: (1) compare actual plate thicknesses to plan dimensions to verify construction; (2) to give an indication of loss of section; (3) establish a base thickness for future inspections. All measurements were taken with an ultrasonic gage.

The ultrasonic gage used was model DM-2 LCD, manufactured by Krautkramer - Branson Inc. of Stratford, Connecticut. ITD ID. # 635128

The gage was calibrated prior to and after field use by comparing micrometer readings on a section of A 588 steel to gage readings and adjusted accordingly. The following procedure was used in taking measurement readings:

1. The settings on the ultrasonic gage were checked at each location where the readings were taken.

2. Measurements were taken from only one side of the plate. The area where the readings were to be taken was prepared by scraping with a wide blade putty knife and then vigorously brushing with a wire brush. The purpose of the preparation was to provide a reasonably smooth surface for the probe. Only the outer surface of the oxide coating was removed.

3. Four thickness readings were taken at each location. The average of these readings and their location is shown in the Plate Thickness Table.

APPENDIX D

PLATE THICKNESS MEASUREMENTS

Bridge Number	Bridge Location	Location of Measurement	Specified Thickness	Average Field Measurement	Adjustment	Ave. Adj. Measurement
09520G 507.57	Bonners Ferry Br. US-95 over Kootenai R.	East int. girder web plate, 10" from north abut. brg stiffener and 8" below top flange	0.50 "	0.507"	0.004"	0.511"
09520G 507.57	Bonners Ferry Br. US-95 over Kootenai R.	East int. girder top flange - 10" from north abut. brg stiffener	0.75"	0.765"	0.008"	0.773"
00300A 84.19	St. Maries Br. SH 3 over St. Maries R.	North ext. beam web in span 2 at diaphragm near pier 1, @center-line of web.	0.598"	0.617"	0.006"	0.604"
08400B 0.89	NW Caldwell IC in Caldwell	Bottom flange of south girder- 2'-6" from span 3 access hole towards abutment 2.	0.625"	0.626"	0.006"	0.632"
08070C 121.61	I-84 WBL over Snake R & UPRR	So. girder web plate, 5' from east end of girder at east abut. & 1'-3" above bottom flange.	0.5625"	0.582"	0.005"	0.587"
08070C 121.61	I-84 WBL over Snake R. & UPRR	South girder bottom flange 5' from east end of girder at east abut. 4" from north edge of flange	1.125"	1.130"	0.015"	1.145"
97553A 0.20	Ninth St. over Boise River	East box girder bottom flange plate 1'-9" from west web and 9' from north abutment.	0.5"	0.547"	0.004"	0.551"
97553A 0.20	Ninth St. over Boise River	West girder - east web, 4'-8" from south abut. bkwl. and 8" above bottom flange.	0.5625"	0.561"	0.005"	0.566"
97433A 9.96	UPRR over Vista Ave.	South box girder RR side web plate 4'-8" from east end of girder and 17" from top flange	0.75"	0.772"	0.008"	0.781"
3910A 2.62	SH 39 SBL over Snake R.	North girder bottom flange at first drain pipe from pier # 6, span # 5 & 4" from inside flange edge.	2.25"	2.281"	0.035"	2.316"
01571I 6.59	Broadway St over Snake R.	South first interior girder, 24" from abutment # 1 bearing stiffener and 37" from top flange.	0.5"	0.526"	0.004"	0.530"
02020K 344.44	US 20 SBL over so. fk. Teton R.	West exterior beam web, 19" from face of abutment # 1 and 14" from top flange.	0.548"	0.551"	0.004"	0.555"

COLOR OF OXIDE.

Color	Condition.
Yellow orange	Initial stage of exposure
Light brown	Early stage of exposure
Chocolate brown to purple brown	Development of protective oxide
Black	Nonprotective oxide

TEXTURE OF OXIDE.

Texture	Condition
Tightly adherent, capable of withstanding hammering or vigorous wire brushing	Protective oxide
Dusty	Early stages of exposure; should change after a few years
Granular	Possible indication of problem depending on length of exposure and location of structure
Small flakes, 6 mm (1/4 in.) diameter	Initial indication of non-protective oxide
Large flakes, 12 mm (1/2 in.) diameter or greater	Non-protective Oxide
Laminar sheets or nodules	Non-protective oxide, severe corrosion

The above tables are from NCHRP report 314.

APPENDIX F

WEATHERING STEEL SELECTION CRITERIA

I. Design

1. Purpose - The purpose of the office standard is to provide guidelines to the engineer for the proper application of uncoated weathering steels and to make recommendations for maintenance to ensure continued performance of the steel. This criteria is taken from the FHWA Technical Advisory "Uncoated Weathering Steel in Structures", dated October 3,1989.

2. Selection Criteria

A. Environmental considerations where weathering steel may not be used.

(1) High rainfall, high humidity or persistent fog.

(2) Industrial areas where chemical fumes may drift onto the structure. If the sulfur trioxide level is greater than 2.1 mg/100 cm^2/day average weathering steel shall not be used.

(NOTE: This would apply near fertilizer plants, such as the FMC Plant in Pocatello, Potlatch Plant in Lewiston, etc.)

B. Geometrics and location

(1) Grade Separations - The so-called "tunnel effect" is produced by the combination of narrow depressed roadway sections between vertical retaining walls, narrow shoulders, bridges with minimum vertical clearances and deep abutments adjacent to the shoulders as are found at many urban/suburban grade separations. These roadway/bridge geometrics combine to prevent roadway spray from being dissipated by air currents and can result in excessive salt in the spray being deposited on the bridge steel. Figure 1 shown below is representative of situations where use of uncoated weathering steel should be avoided where winter deicing salt use is significant.

NOTE: There is no evidence of salt spray causing excessive corrosion in cases of narrow bridges with wing walls parallel to the overcrossing road.

From ITD Bridge Design Manual, section E-11.

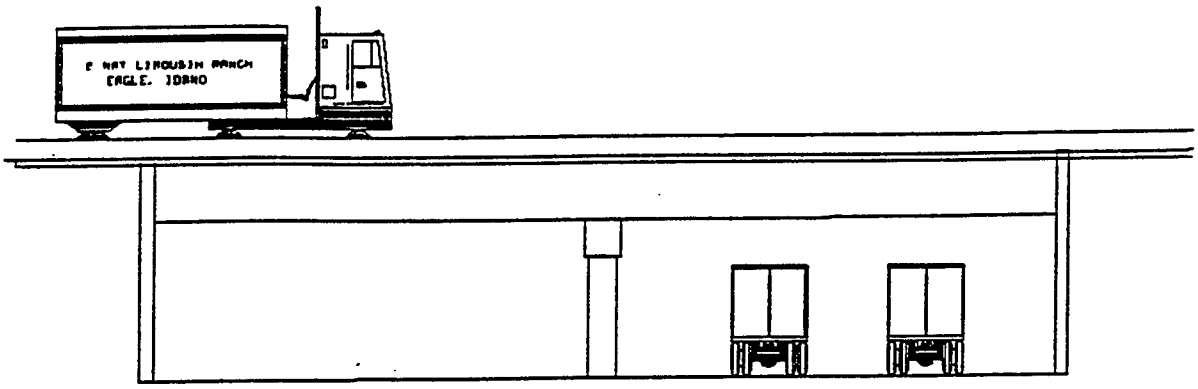

Figure 1 DEPRESSED ROADWAY TUNNEL EFFECT

(2) Low Level Water Crossings - Sufficient clearance over bodies of water must be maintained so that spray or condensation or water vapor does not result in prolonged periods of wetness of the steel. Clearance to bottom flange of at least 10 feet over sheltered, stagnant water and at least 8 feet over running water is recommended.

C. Method of Selection

(1). The Bridge Engineer, in cooperation with the Group Leaders, will make the selection. The selection will be based on stress, economics, environmental considerations, and aesthetics.

(2). The selection will be made at the preliminary design stage.

3. Design Details - When weathering steel is used, the following design details should be utilized.

A. Controlling Roadway Drainage - This is the first line of defense against localized corrosion - eliminating the exposure of the steel to contact with drainage from the roadway above, especially in areas where roadway salts are used.

(1) Joints:

a. To the extent possible, bridge joints should be eliminated. Virtually every bridge with joints has problems (corrosion, rideability, maintenance)

From ITD Bridge Design Manual, section E-11.

attributable to the joint.

b. Extensive experience has shown that obtaining a permanent water-tight bridge joint is an elusive goal. Therefore, when joints are necessary, the assumption should be that the joints will leak and that drainage will contact the steel. Therefore, all steel within a minimum distance of 1 1/2 times the depth of the girder from the joint should be coated. In addition, Finger Joints shall not be used with weathering steel bridges unless given prior approval of the Bridge Engineer.

c. Drip bars on the top and bottom of the lower flanges can be effective in intercepting drainage and preventing it from running long distances along the flange and causing corrosion of the uncoated steel. However, welding of any attachment to the tension flange should be considered only after a thorough analysis of the impact of the attachment on fatigue life of the member.

d. Fascia Girders - There is no evidence that coating the entire fascia girder will add to the service life of an otherwise uncoated bridge. Therefore do not paint exterior girder execpt in the area of expansion joints.

(2) Scuppers

a. The spacing between drainage scuppers should be maximized in accordance with established hydrologic and hydraulic design. The FHWA Report No. FHWA/RD/87/014 "Bridge Deck Drainage Guidelines" (see Section F-17), provide sound recommendations in this regard. As scupper spacing increases, the volume of water required to pass through each scupper increases, thus creating velocities high enough to flush outlets clogged by deposits from low volume rainfalls.

From ITD Bridge Design Manual, section E-11.

b. Scupper downspouts should be designed and placed such that drainage will not contact the steel surface. However, details used to connect scuppers to drain pipes have often created more problems than they have prevented. Do not use flat runs of piping and elbows which clog or connections that separate. Careful detailing is critical.

c. Scupper drain pipes should not be routed through closed box sections where leakage inside of the box is possible, and may go undetected for long periods of time.

B. Other Features

(1) Water Traps - All details must be designed to provide natural drainage. Small copes in corners of plates or small drain holes are easily plugged, and should not be relied on to provide drainage.

(2) Box Sections

a. Box sections which are too small to provide for adequate visual inspection and access for maintenance personnel should be painted and weep holes to allow proper drainage and circulation of air should be provided.

b. Larger boxes should be detailed to minimize the entrance of water, debris and dirt which can promote corrosion. They must also provide for natural drainage of water that may enter and adequate access for inspection, cleaning and maintenance when necessary. Precautions should include:

i. Locked covers or screens over access holes to prevent the entry of animals and birds or unauthorized personnel. Covers over manholes should be on hinges and provided with a lock to allow easy access by inspection

From ITD Bridge Design Manual, section E-11.

personnel.

ii. Provision of positive drainage and adequate ventilation to minimize the wetting of the interior surfaces from water or condensation.

iii. Painting of the inside of the box members should be considered. Weep holes should also be provided to allow for proper drainage and air circulation.

(3) Concrete Surfaces - After passing over uncoated weathering steel, drainage leaves dark, non-uniform and often unsightly stains on concrete surfaces. This problem can be mitigated, if desired, by using one or more of the following approaches:

a. Wrapping the piers and abutments during construction to minimize staining while the steel is open to rainfall.

b. Allowing/requiring the contractor to remove staining with a commercial solvent after completion of construction.

c. Applying epoxy or some other material to coat and/or seal the concrete surfaces against staining.

(4) Overlapping surfaces - If water is allowed to flow over overlapping joints, capillary action can draw the water into the joint and cause "rust-pack" to form. Therefore, the contact surfaces of overlapping joints must be protected from intrusion of rainfall and runoff. This applies to non-slip-critical bolted joints as well as to overlapped joints such as those in tapered high mast lighting poles. The faying surfaces should be painted or sealed to prevent the capillary penetration. In slip-critical bolted splices, "rust-pack" should not occur when the bolts are spaced as per AASHTO specifications.

From ITD Bridge Design Manual, section E-11.

II. Maintenance Actions - Effective inspection and maintenance programs are essential to ensure that all bridges reach their intended service life. This is especially true in the case of uncoated weathering steel bridges. The following maintenance actions should be routine:

A. Inspection - Implement inspection procedures that recognize the unique nature of uncoated weathering steel and the conditions resulting from excessive corrosion damage. Develop inspection guidelines that highlight the structural features to be inspected and also illustrate the difference between the desired oxide coating and excessive rust scaling. Measurements of the oxide coating thickness should be taken during each bridge inspection and recorded in the bridge inspection reports.

B. Controlling Roadway Drainage - To the extent feasible the following should be done:

(1) Divert approach roadway drainage away from the bridge structure.

(2) Clean troughs of open (finger) joints and reseal "watertight" deck joints.

(3) Maintain deck drainage systems (scuppers, troughs, etc.) in order to divert deck drainage away from the superstructure steel and substructure units.

(4) Periodically clean and repaint all steel within a minimum distance of 1 1/2 times the depth of the girder from bridge joints.

C. Other Maintenance

(1) Remove dirt, debris and other deposits that hold moisture and maintain a wet surface condition on the steel. In some situations, hosing down a bridge to remove debris and contaminants may be practical and effective. Some agencies have a regularly scheduled program to hose down their bridges.

(2) Maintain screens over access holes in box sections to prevent entrance by animals and birds.

(3) Remove growth of nearby vegetation that prevents the natural drying of surfaces wet by rain, spray or other sources of moisture.

From ITD Bridge Design Manual, section E-11.

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