ATKINS
Member of the SNC-Lavalin Group

2270 Corporate Circle Suite 200,
Henderson NV. 89074 United States of America

74419 I-15 TRUCK CLIMBING LANE PROJECT

STRUCTURAL FINDINGS MEMO FOR:

QUADRUPLE CELL 10ft x 6ft RCB CULVERT

NORTH AND SOUTH BOUND LANES

PREPARED FOR:

STATE OF NEVADA

DEPARTMENT OF TRANSPORTATION

DATE: 06/13/2022

PREPARED BY ATKINS

SITE OBSERVATION PERFORMED BY:

MICHAEL NA-O

ON MAY 25, 2022

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Summary

In accordance with an agreement with the Nevada Department of Transportation (NDOT), Atkins provided design services that includes a condition assessment of the I-15 bridges ID numbers B691S and B690N. The two bridge structures are located on the I-15, north of Las Vegas at mile post 71.9. Roughly a 54-minute drive from Reid International Airport. This condition assessment was to assess the need for repair of these two structures. Each structure consists of a 4-cell reinforced concrete box with each individual cell span at 10’ width, 6’ height and a length of 48’. This memo describes the conditions observed during the visual condition assessment.

Visual Inspection

The structure is in good condition overall. Minor cracking is present in exterior and interior surfaces of the structure. Minor spalling was also identified in the culvert ceiling together with exposed and corroded rebar. The cracks and spalling ranged from 10”-24”, to include efflorescence and leakage found in the lower portion of the top slab. Floor delamination and 2” diameter drill holes with exposed rebar were also identified on the ceiling of most culverts. (More detail on location and discrepancies are in results)

At surface level, the asphalt was in satisfactory condition. The barrier rails and headwalls on the non-refurbish side were also in good condition. Overgrown vegetation was in obstruction of potential flow through the east opening of SB lanes and are recommended to be removed before restoration.

Introduction

The purpose of this assessment was to evaluate the condition and repair needs of the existing RCB structures of number B691S and B690N. The location of the two structures are at coordinates 36°28'19" N, 114°49'15" W. The quadruple reinforced concrete structure has an opening of 10’ in the horizontal and 6’ in the vertical direction. The length of the culvert runs perpendicular to traffic and is 48’ sloping towards the west. Throughout the condition assessment each cell and wingwall was visually inspected and data recorded for observed discrepancy and previous repair.

Equipment and Procedures

The equipment used for the site analysis were a measuring tape, structure plan drawing, and a camera to record data. For further details on the structure inventory, appraisals, and bridge load rating please reference NDOT Bridge Inspection Report 11/18/2020.

The assessment of the two culverts focused on areas throughout the culvert cells, barrier rails, and along the wingwalls. Critical problem areas identified are at the interior top slab and side walls.

Photographs of the structure were taken to convey its current condition and corroborate the repairs needed for these two structures. Photographs of distressed areas and/or areas of concern and areas depicting the general overall condition of elements of the structure are provided in the findings of this memo.

The depicted diagram 2. shows areas of the culvert that have been recently repaired, and areas of concern. Each are identified with a reference number (diagram to image) showing the location and concern or previous work done on the structure. The following field data include pin-point locations determining condition of each cell for both North and South bound lanes. The information gathered is in conjunction with NDOT bridge report will help estimate the restoration cost amounts for culverts B691S and B690N.

Site Location

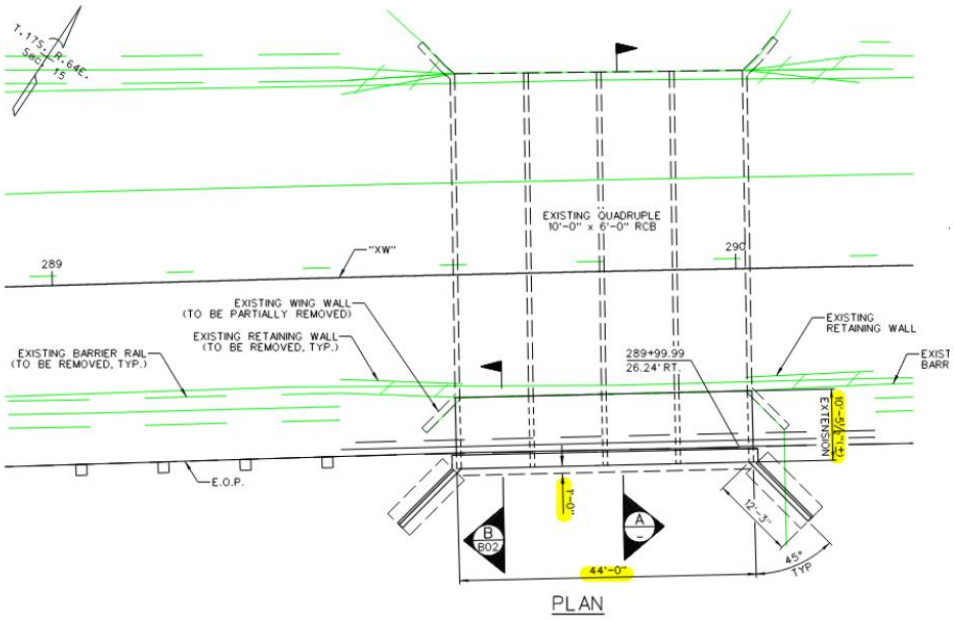
The Truck Climbing Lane Project is located north of Las Vegas in the Moapa Valley. Mile post 71.9 as shown in figure 1. below. Currently there are two lanes traveling in each direction for both NB and SB lanes at a speed limit of 75 mph. The widening of the freeway calls for a 10’ addition to east shoulder of the SB road at the locations of these two structures, therefore extending the width of the culvert adding roughly 10’ to the reinforced concrete box.

Fig.1 Site Location in Reference to Las Vegas Valley

Fig.2 North and South bound Culvert (4 Cell RCB)

-South Bound RCB Findings-

Findings (SB)



Dia. 1 Plans for RCB Extension

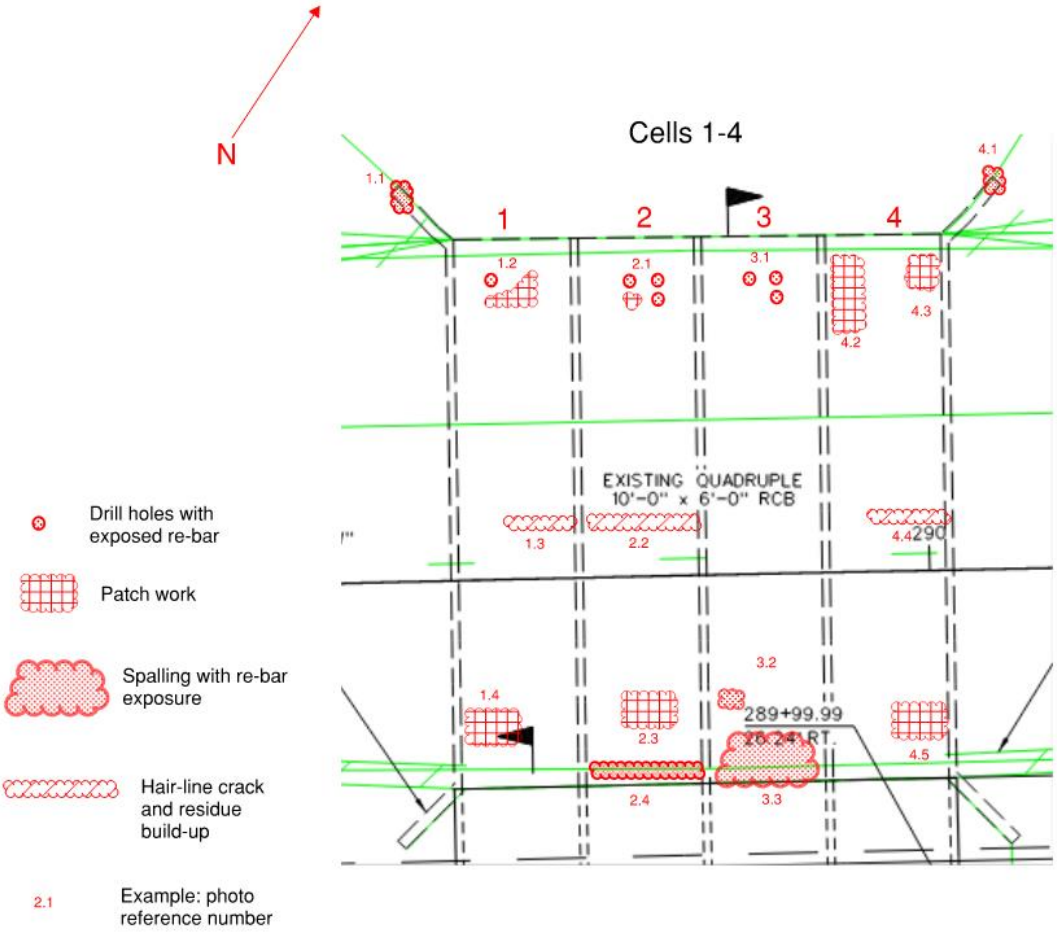


Diagram 2. Existing Structure conditions

Findings (SB Culvert)

East side of culvert (Construction side)

Cell 1 Photos

1.1 (6" x 6" Spall concrete)

1.2 (1.5" dia. drill hole x 1)

1.3 (26" Efflorescence)

1.3 (wide angle)

Cell 2 Photos

2.4 (26" Spall)

2.3 (Patch work)

2.1 (2" dia. drill hole w/ exposed re-bar x 3)

2.2 (4’ Efflorescence)

4'x4' delaminated floor west end of cell 2

2.2 (4' across the top slab wide view)

Cell 3 Photos

3.1 (2" dia. drill hole w/ exposed re-bar x3)

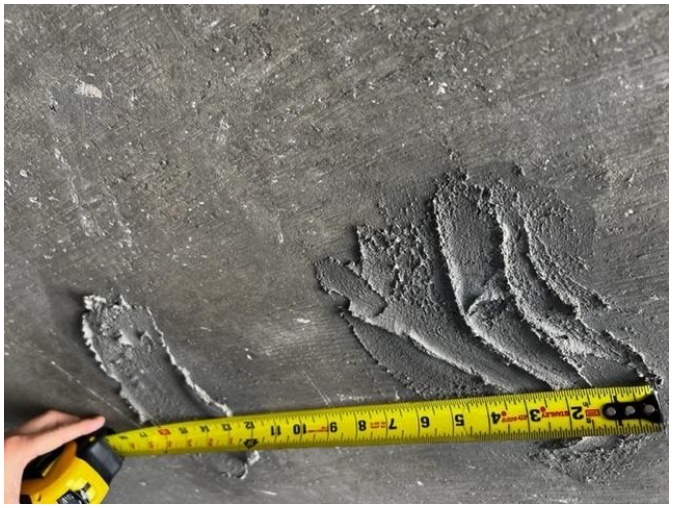
3.2 (4"x4" Spall)

3.3 (1'x 2' spall with exposed re-bar)

Cell 4 Photos

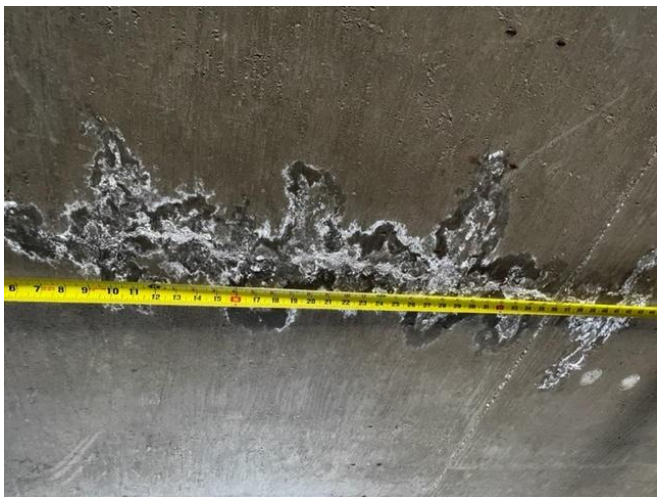
4.2 (patch work)

4.5 (patch work)



4.3 (patch work)

4.1 (15" spall at wing wall corner)



4.4 (4' Efflorescent)

Other Site Reference Images

West Elevation (non-construction side)

East wing walls (Construction Side)

West wing walls (Repair side)

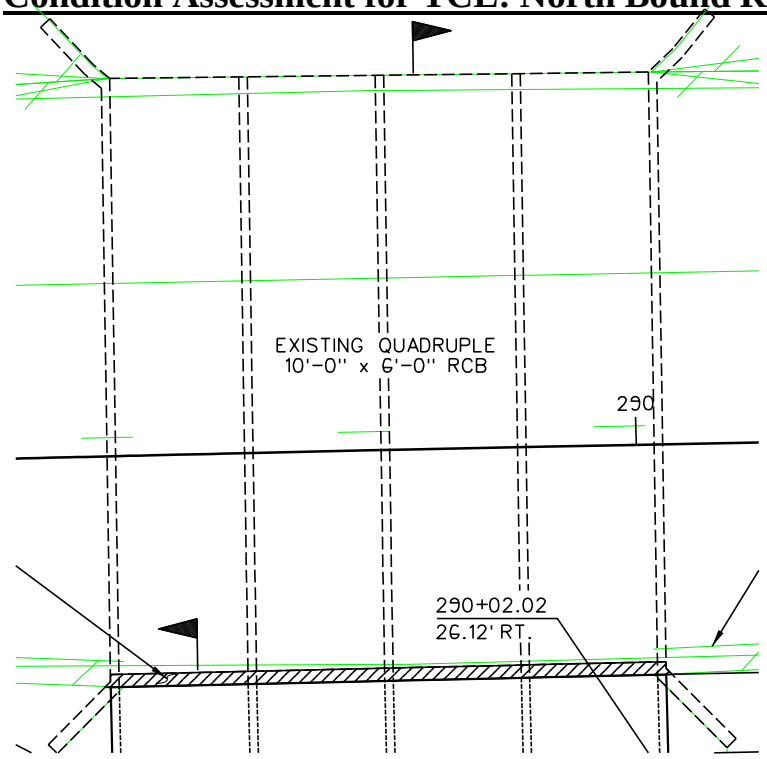
East elevation (Construction side)

East barrier rails (construction side: to be replaced)

-North Bound RCB Findings -

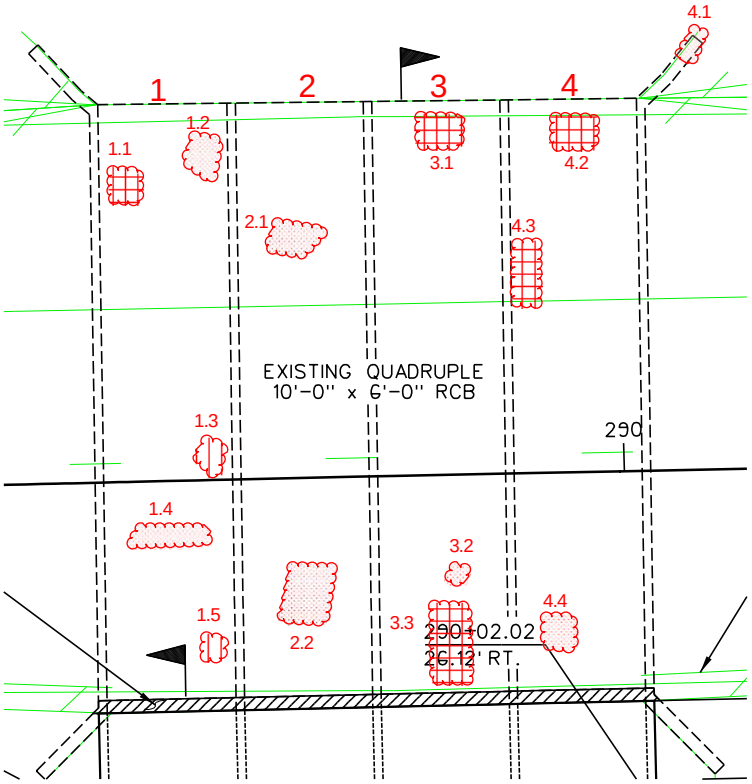
Findings (NB)

Condition Assessment for TCL: North Bound RCB



Existing Structure Plan (Above)

Cells 1-4



N

Spall and or corroded re-bar

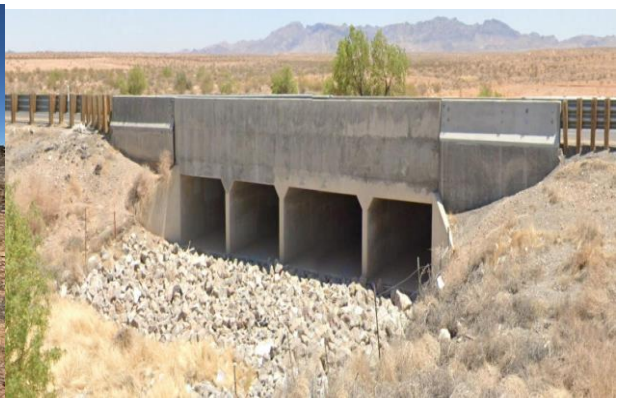
Shrinkage

Patch work

Visual Examination Mark-ups and Image Ref. Number (above)

Findings (SB Culvert)

West Elevation



East Elevation

Cell 1 Photo References

1.2 (8" x 6" drill hole (left) and 18"x12" Spall

1.1 (Patch work)

1.3 (Shrinkage cracks less than 1/64")

1.4 (10" x 16" spall and corroded rebar)

1.5 (shrinkage and exposed bolt)

Cell 2 Photo References

2.1 (9" x 5" spall and corroded rebar)

2.2 (24" x 20" spall)

Cell 3 Photo References

3.1 (Patch work)

3.2 (2" dia. drill hole and corroding rebar through patch work)

3.3(Patch Work)

Cell 4 Photo References

4.4 (patch work)

4.3 (Patch work)

4.2 (Patch work)

4.1 (16" spall -NW Wingwall)

Other Site Reference Images

Barrier Rail (Construction Side)

Repair Needs

The needs identified are for general bridge maintenance and repairs. As identified in the findings, multiple areas will need to be addressed. Spalling, delamination, cracks, and corroded reinforcing bars identified need to be repaired or replaced then sealed. Drill holes with exposed reinforcement bars are to be buffed, resurfaced and sealed. Vegetation and debris removal will also be required for access throughout the restoration process.

Maintenance and/or minor repairs

- Remove vegetation from east opening of RCB (SB Lane)
- Seal/Patch cracks and drill holes in culvert
- Remove and replace corroded rebar
- Seal cracks in wingwalls
- Resurface culvert floor in delaminated area

*Note that the requirements for repairs are shown in the Atkins-NDOT contract plans.

DISCLAIMER

This memo should not be used as the sole basis for the preparation of rehabilitation or repair plans, construction or remedial action, or as a basis for major capital decisions. For further details on the structure inventory, appraisals, and bridge load rating please reference the most recent NDOT Bridge Inspection Reports for B691S and B690N (2020).

References

National Bridge Inspection Program- Compliance Review Manual. U.S. Department of Transportation/Federal Highway Administration. (n.d.). Retrieved June 14, 2022, from https://www.fhwa.dot.gov/bridge/nbis.cfm

NDOT Structures Manual - Nevada Bridge Inspection Program. National Bridge Inspection Standards. (n.d.). Retrieved June 14, 2022, from https://www.dot.nv.gov/home/showpublisheddocument/1733/636183619126870000