

INTRODUCTION

During the annual projections from the Federal Highway Administration for the year 2017 out of 884 bridges registered in Puerto Rico 535 were considered to be under the acceptable conditions. As result of these alarming numbers the department of Civil Engineering of the Polytechnic University of Puerto Rico and its Senior Designs professors decided to put those numbers to the test and assign their students to do visual inspection and structural capacity evaluation of one bridge of the student's choosing.

SCOPE

The project consists of the detailed visual and structural evaluation of each member of bridge #1103 located in Juncos, Puerto Rico by using the current design codes and manuals to find its condition and propose an appropriate retrofit solutions along with a new permanent detour which will serve for traffic control during the repairs to the bridge. Also an alternative road and a rest area building was proposed for drivers to stop during their trip.

LOCATION



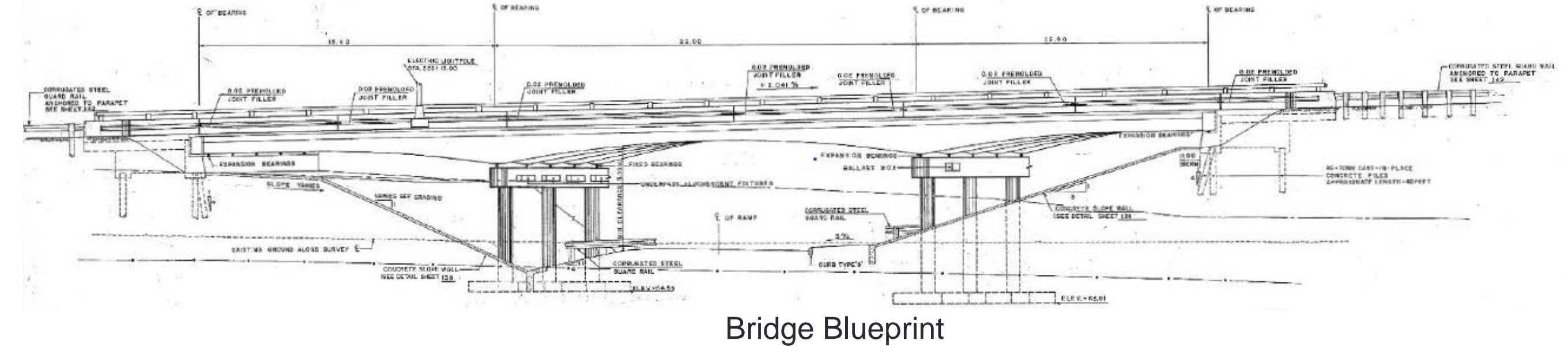
BRIDGE DESCRIPTION

The bridge #1103 and project # AC-003008 is in the state road PR-30 located in Juncos Puerto Rico. The bypass contains two identical bridges with a median that separates them. The one chosen was the right bridge, the Gurabo to Juncos direction. The bridge is 173 feet long and 40 feet wide. It contains 2 lanes of 12 feet each and an exclusive lane for emergencies of 12 feet wide and lesser left side small 4 feet margin which includes concrete barriers. The bridge has a vertical clearance of 14 feet and 6 inches and its superstructure contains the following components: a concrete slab 6 inches thick, 5 T-Girders beams of variable section, 10 steel bearings that support the girders and bent beams, 20 diaphragms and 2 bent beams. The substructure contains: 2 Abutments, 6 columns of 2.50 feet in diameter and the isolated footings.

CONCLUSION

The bridge condition was found to be poor as many aspects of the original 1960's design don't meet the actual codes and manuals requirements for current construction. Specifically, the slab was found to be faulty and a retrofit design was establish to correct it. As far the bearings go they are in immediate need of repair due to extreme corrosion. Finally, a complete design of a bridge deck drainage system was required as water damage was one of the main reasons that other structural elements of the bridge were not up to standard.

BRIDGE EVALUATION



VISUAL INSPECTION

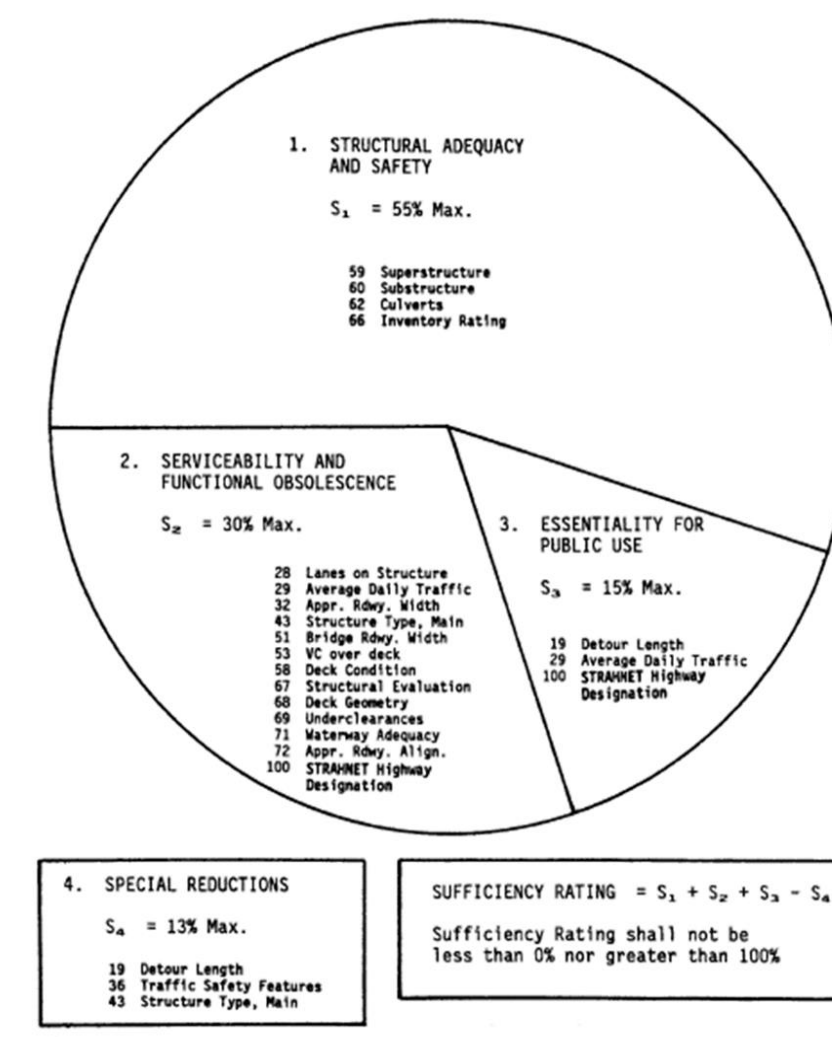
Detailed Element inspection



Bearing plate rating 4

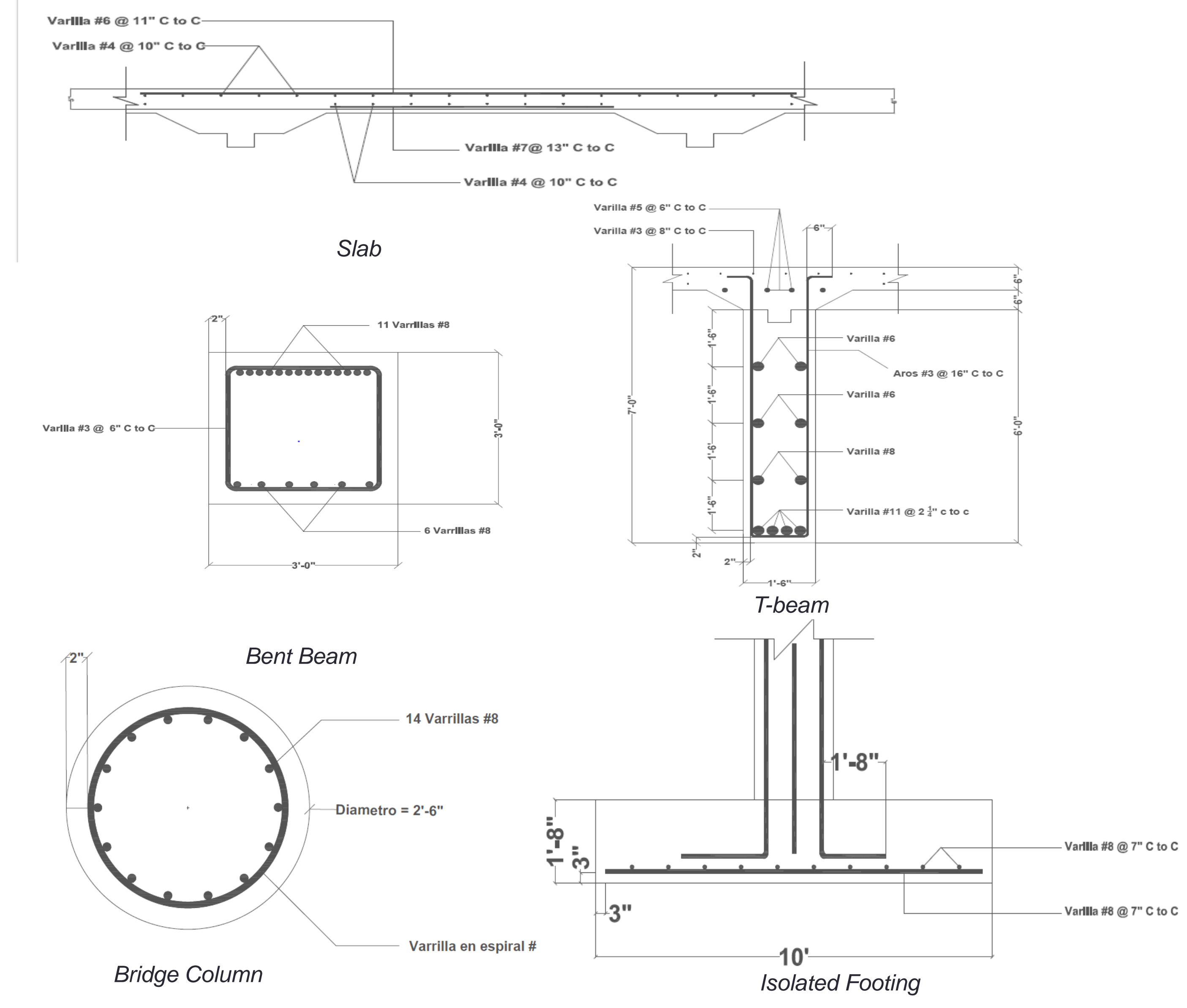
Factor Scale	Percent (%)	Description
1	55	Very Good
2	55	Good
3	40	Poor
4	25	Very Poor

Sufficiency Rating

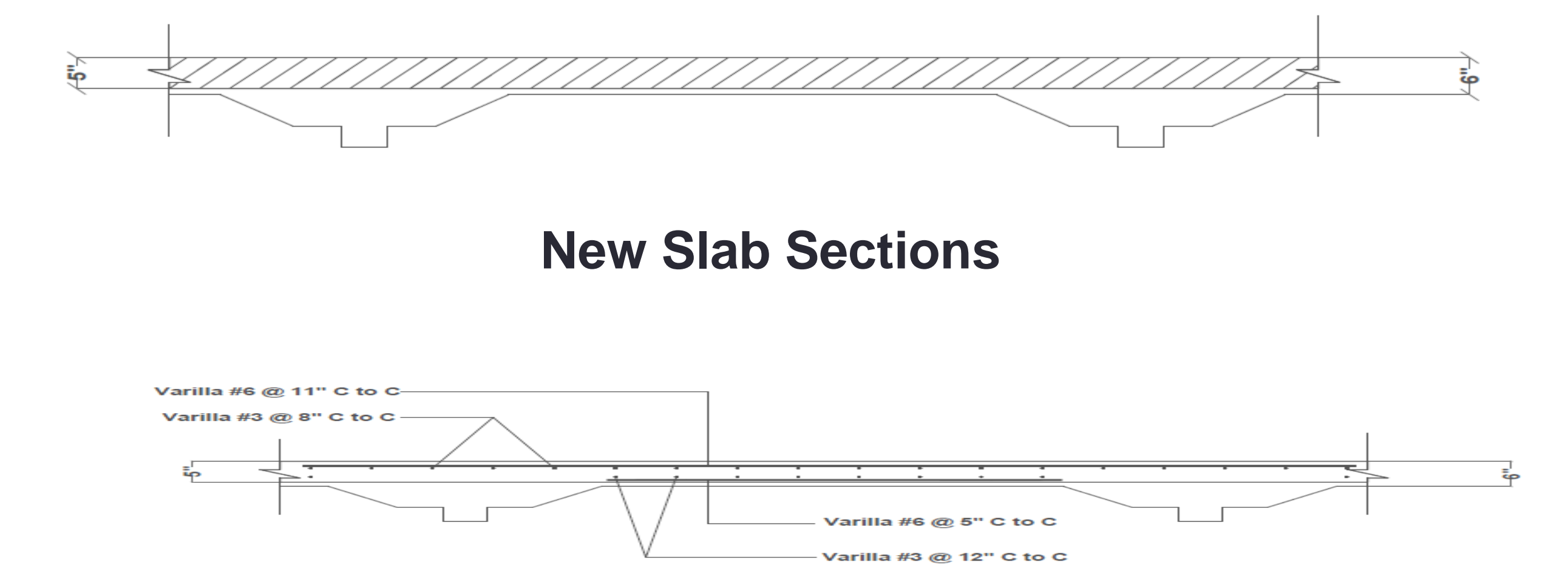


SR=50%

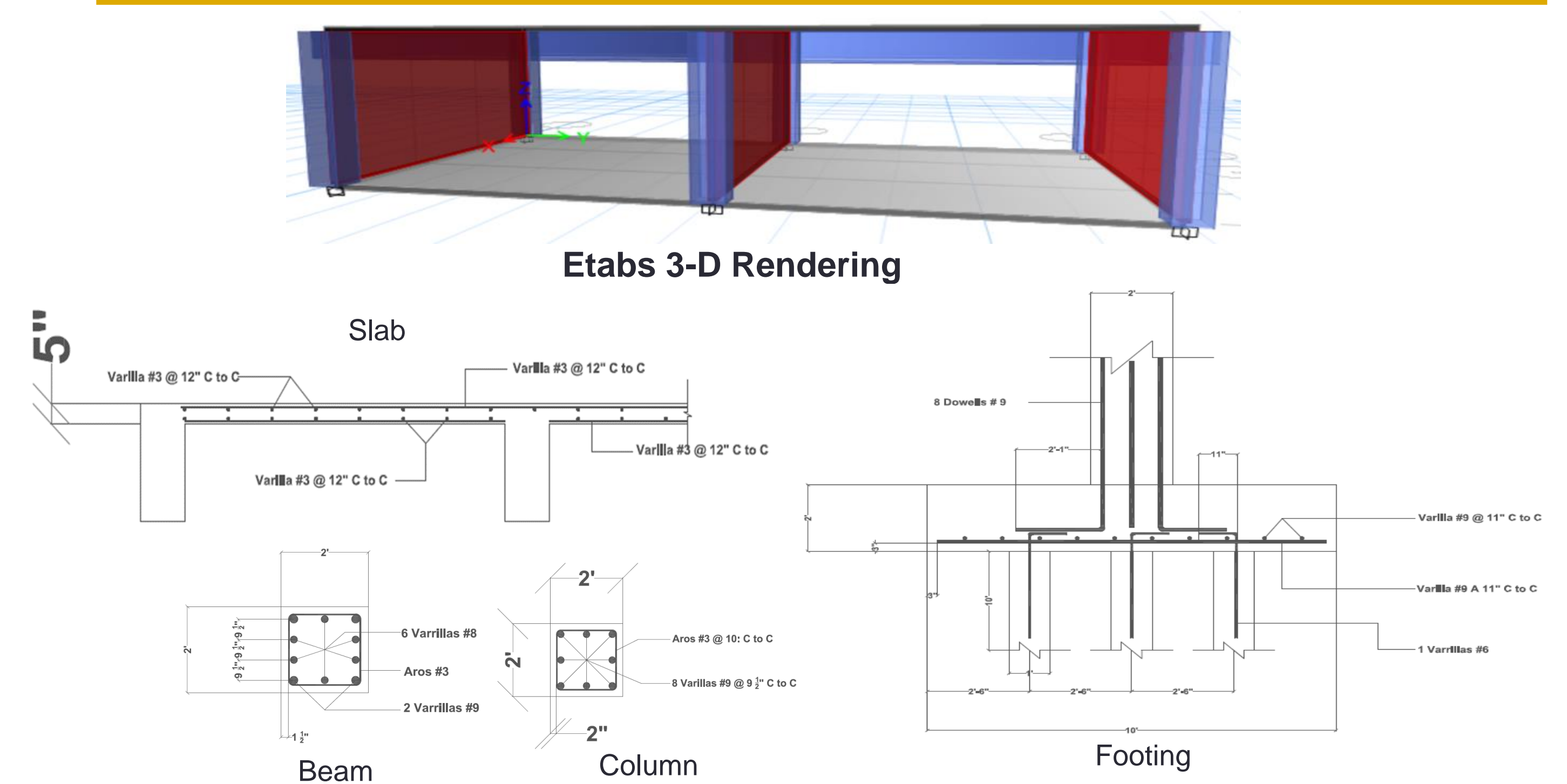
Required Sections



BRIDGE RETROFIT



REST AREA



DETOUR



COST ESTIMATE

- Retrofit: \$403,677.0
- Drainage: \$26,500.0
- Rest Area: \$719,487.0
- Detour: \$4,658,461.0
- Total: \$5,808,125.0

REFERENCES

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