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Ten Mile Road Interchange and Bridge Design

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Abstract

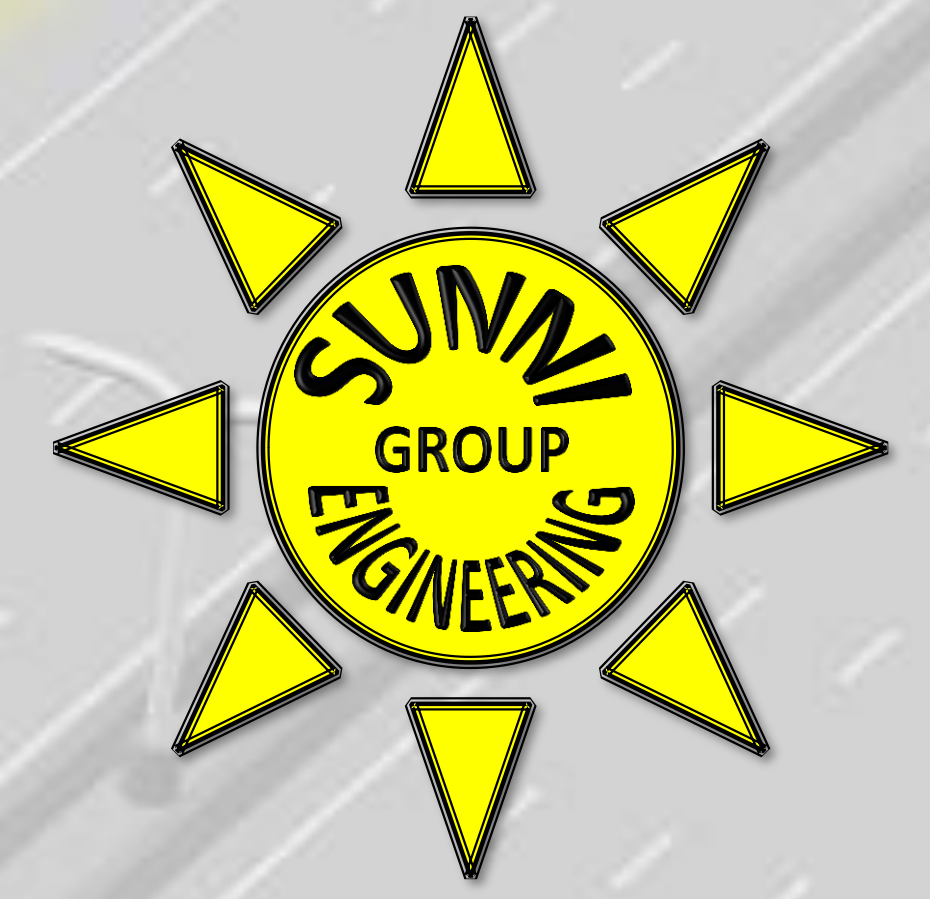
The Ten Mile Road Bridge crossing I-84 in Meridian, Idaho was determined to be inadequate. A new interchange capable of accommodating traffic volumes through 2030 has been proposed. We will demonstrate through computer modeling that a Single Point Urban Interchange (SPUI) configuration is a safe and effective interchange option for managing the Ten Mile Road configuration. Design of the Single Point Urban Interchange (SPUI) will include a new six lane, composite, simple span bridge with four ramps converging on a single traffic control point. The bridge design is composed of two simple spans supported by piers and abutments. Reinforced concrete supported by steel girders will comprise the bridge deck. The foundations, retaining walls, and embankments will be designed. A stormwater management system will be incorporated with retention ponds for handling site runoff. All design will be completed in accordance with proper codes and requisite permits.

Disciplines

Civil and Environmental Engineering

Authors

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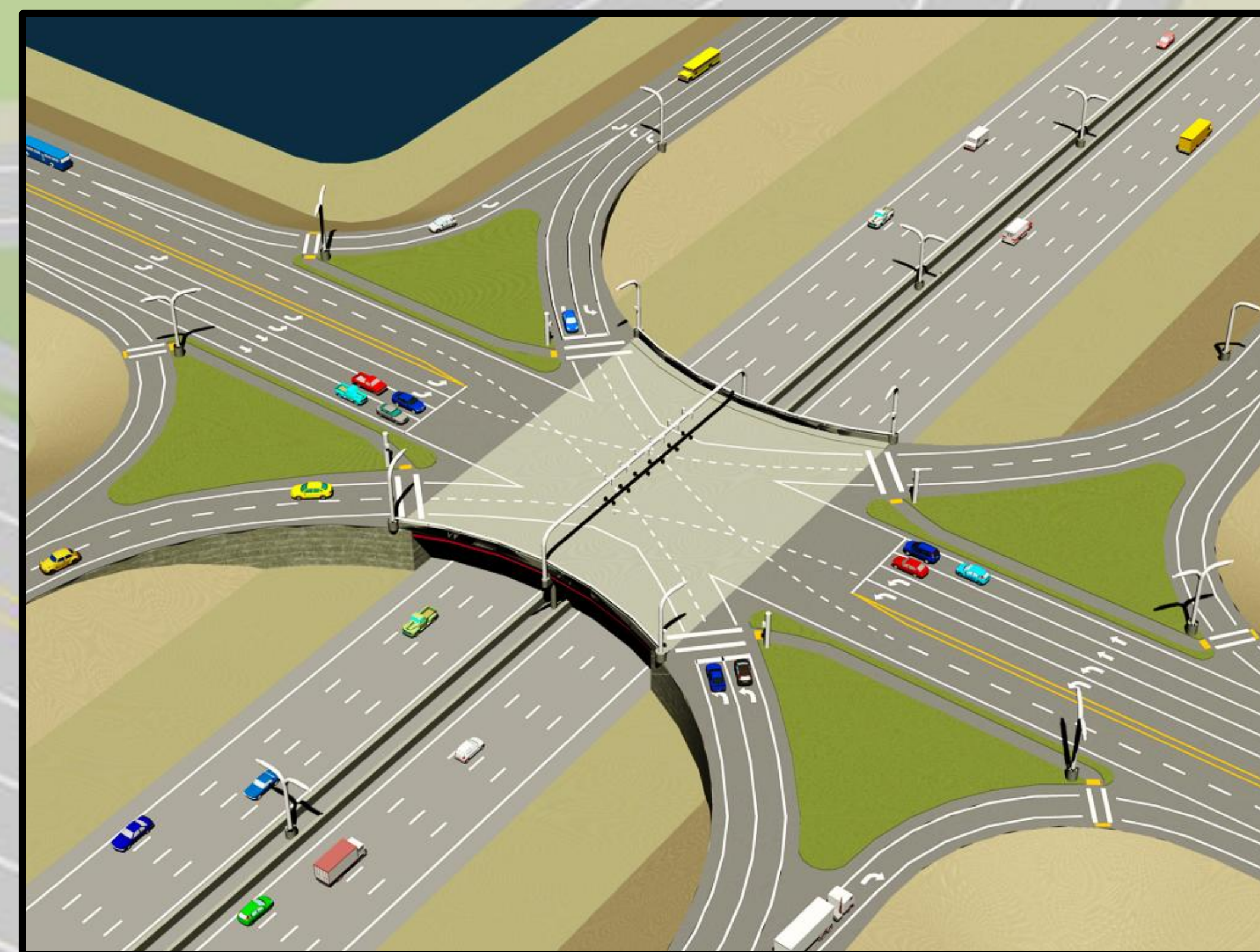


ABSTRACT

The Ten Mile Road Bridge crossing I-84 in Meridian, Idaho was determined to be inadequate. A new interchange capable of accommodating traffic volumes through 2030 has been proposed. We will demonstrate through computer modeling that a Single Point Urban Interchange (SPUI) configuration is a safe and effective interchange option for managing the Ten Mile Road configuration. Design of the Single Point Urban Interchange (SPUI) will include a new six lane, composite, simple span bridge with four ramps converging on a single traffic control point. The bridge design is composed of two simple spans supported by a pier and abutments. Reinforced concrete supported by steel girders will comprise the bridge deck. The foundations, retaining walls, and embankments will be designed. A stormwater management system will be incorporated with retention ponds for handling site runoff. All design will be completed in accordance with proper codes and requisite permits.



Location of Project – Ten Mile Interchange Bridge Interchange in Meridian, Idaho.

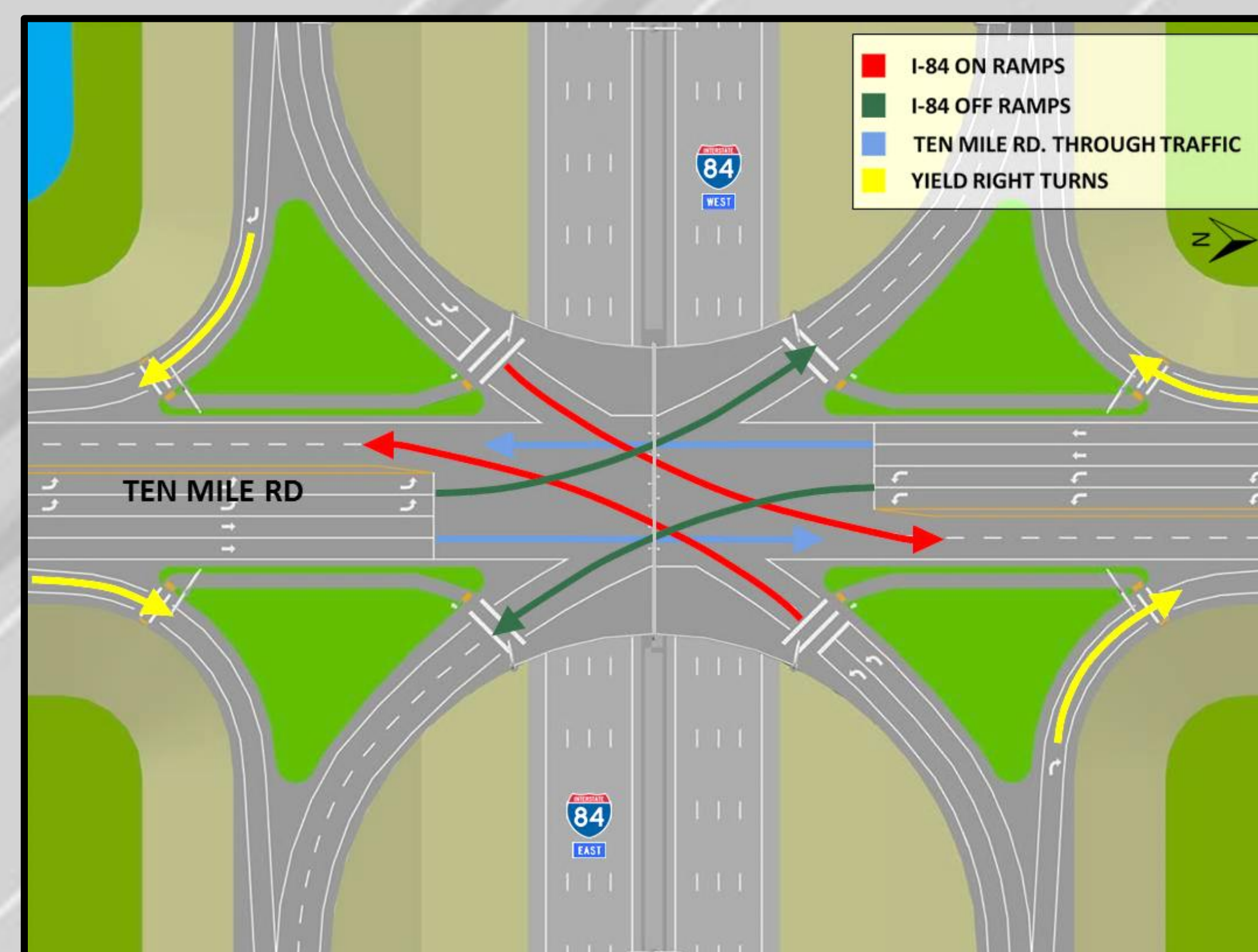


3D Model – Rendering of Ten Mile Bridge Interchange.

TRANSPORTATION

The SPUI was chosen as the best configuration to efficiently operate at current and 2030 traffic demands.

- A single set of traffic lights allows for simultaneous left turns from both directions of the intersection.
- Free flowing right turn movements reduce number of collisions and provide wider turns for large vehicles.
- The traffic flow was modeled using HCS, a computer traffic simulation, to achieve the highest level of service.

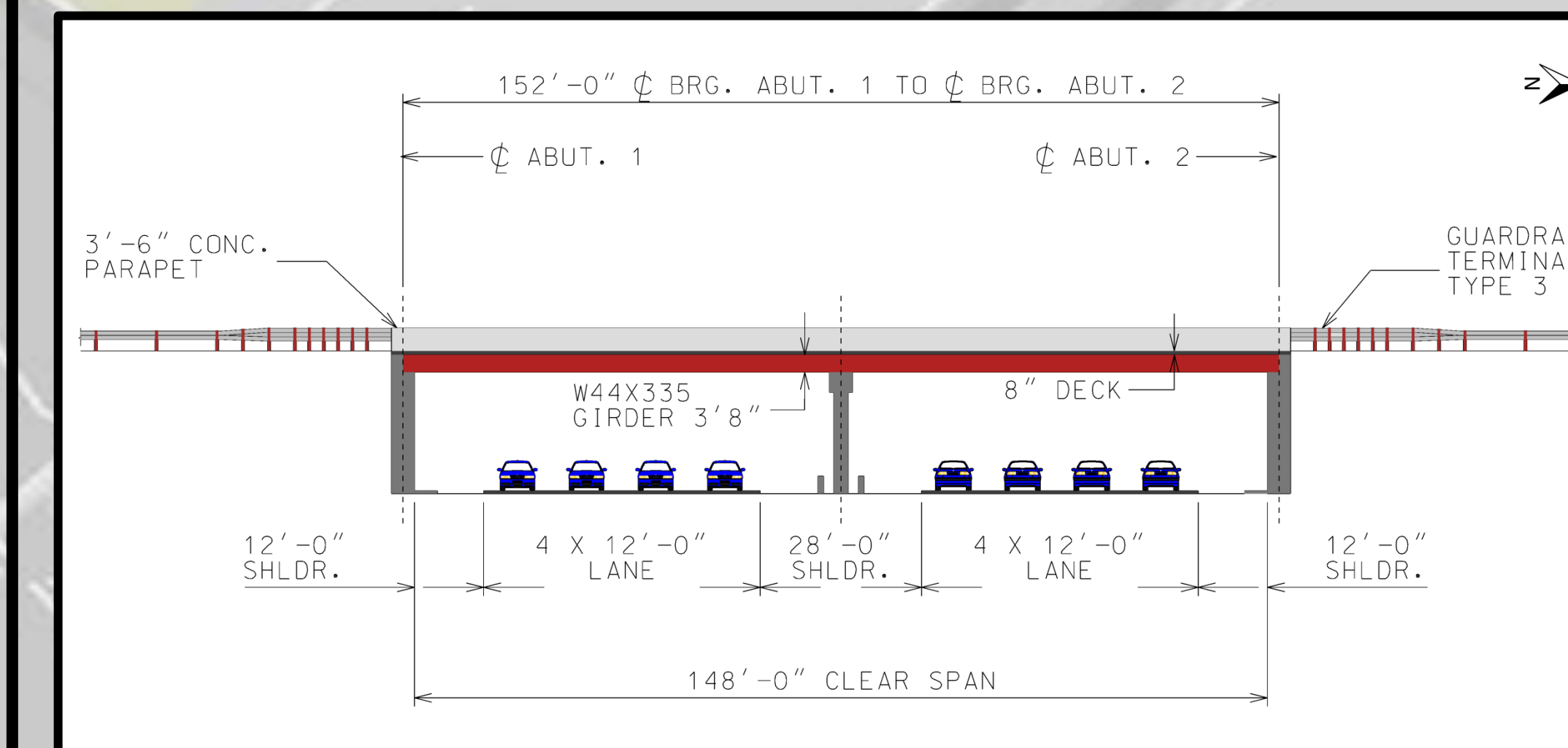


Traffic System – SPUI configuration with traffic patterns.

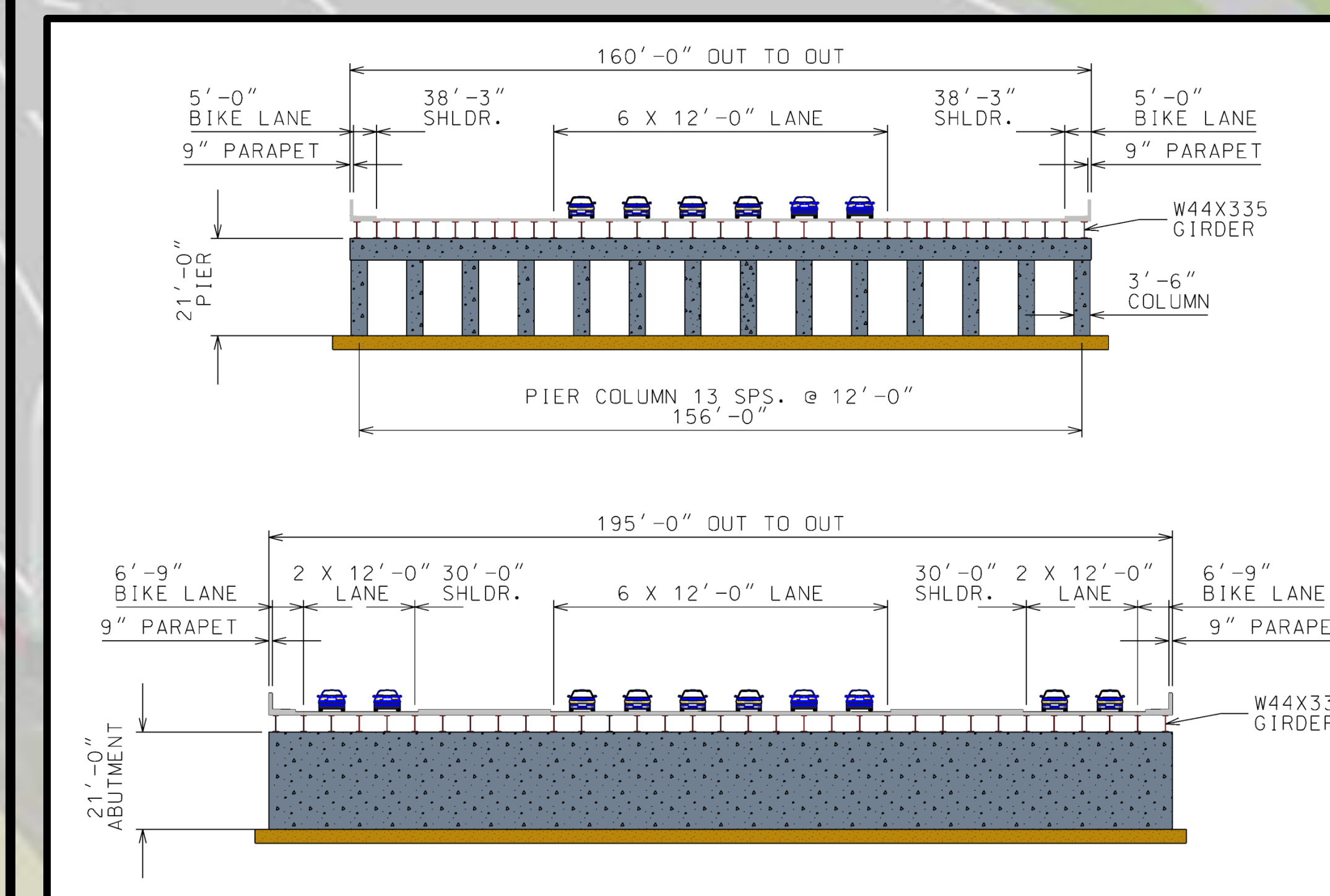
STRUCTURAL

The bridge is composed of a composite steel and concrete superstructure supported by reinforced concrete piers and abutments.

- 8 in. reinforced concrete deck.
- W44 X 335 (A992) steel girders.
- 48 in. X 56 in. reinforced concrete pier cap.
- 42 in. reinforced concrete columns spaced at 12 ft. o.c.



Bridge Profile – Layout of clearances and scope for the new bridge.



Bridge Cross Section – Layout at Piers and Abutments.

ENVIRONMENTAL PLANNING

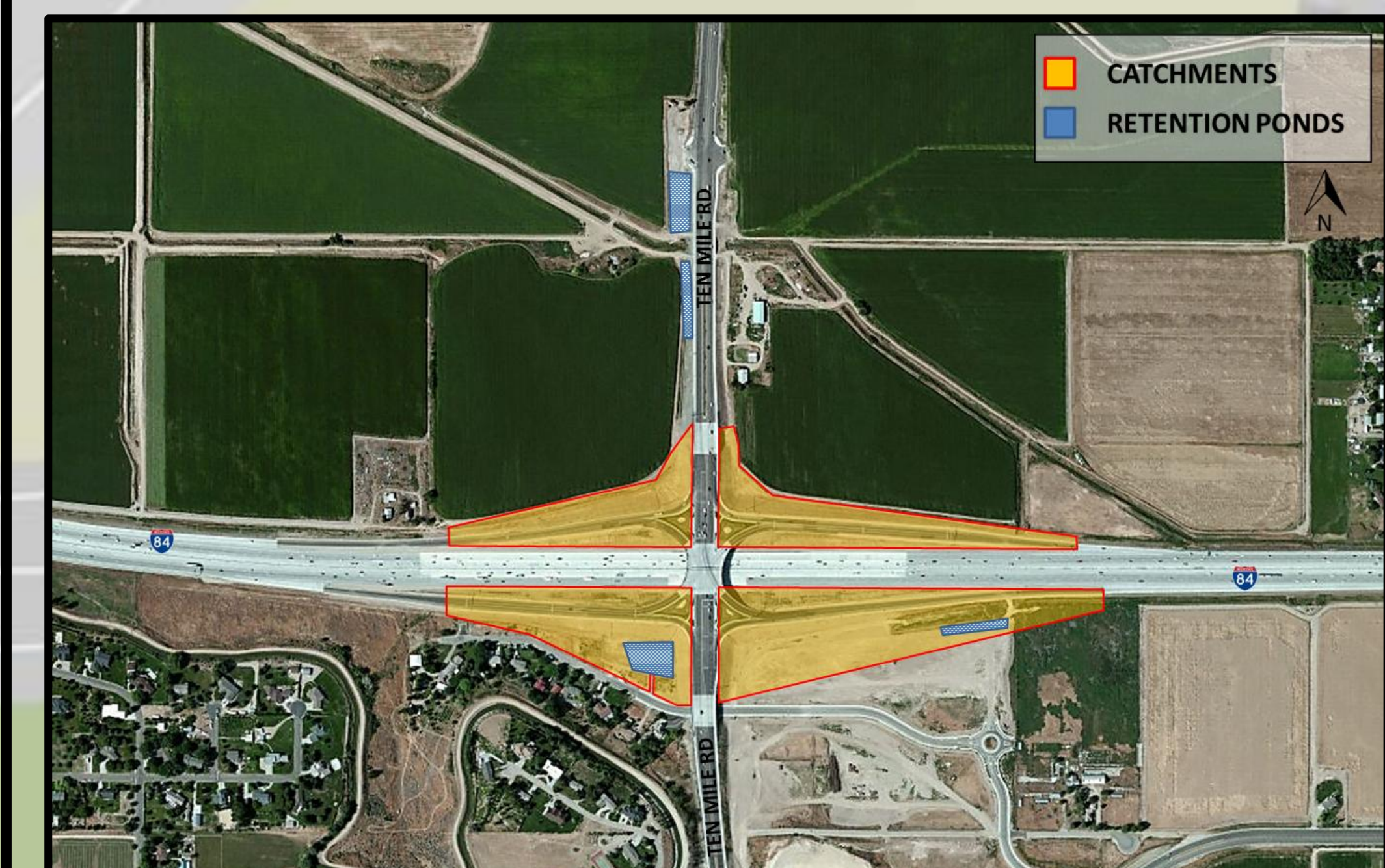
The Federal Highway Administration (FHWA) has determined that the project will have no significant impact on the human or natural environment.

- A Finding of No Significant Impact (FONSI) and A Notice of Intent (NOI) certifying eligibility conditions shall be submitted.
- The NOI will be filed with the U.S. Environmental Protection Agency (EPA).

STORMWATER MANAGEMENT

Analysis of the stormwater hydrology is required for estimating flow peaks, volumes, and time distributions of stormwater runoff.

- The project area was divided into four catchments.
- The required storage was calculated by analyzing 6-hour, 50-year, and 100-year return events.

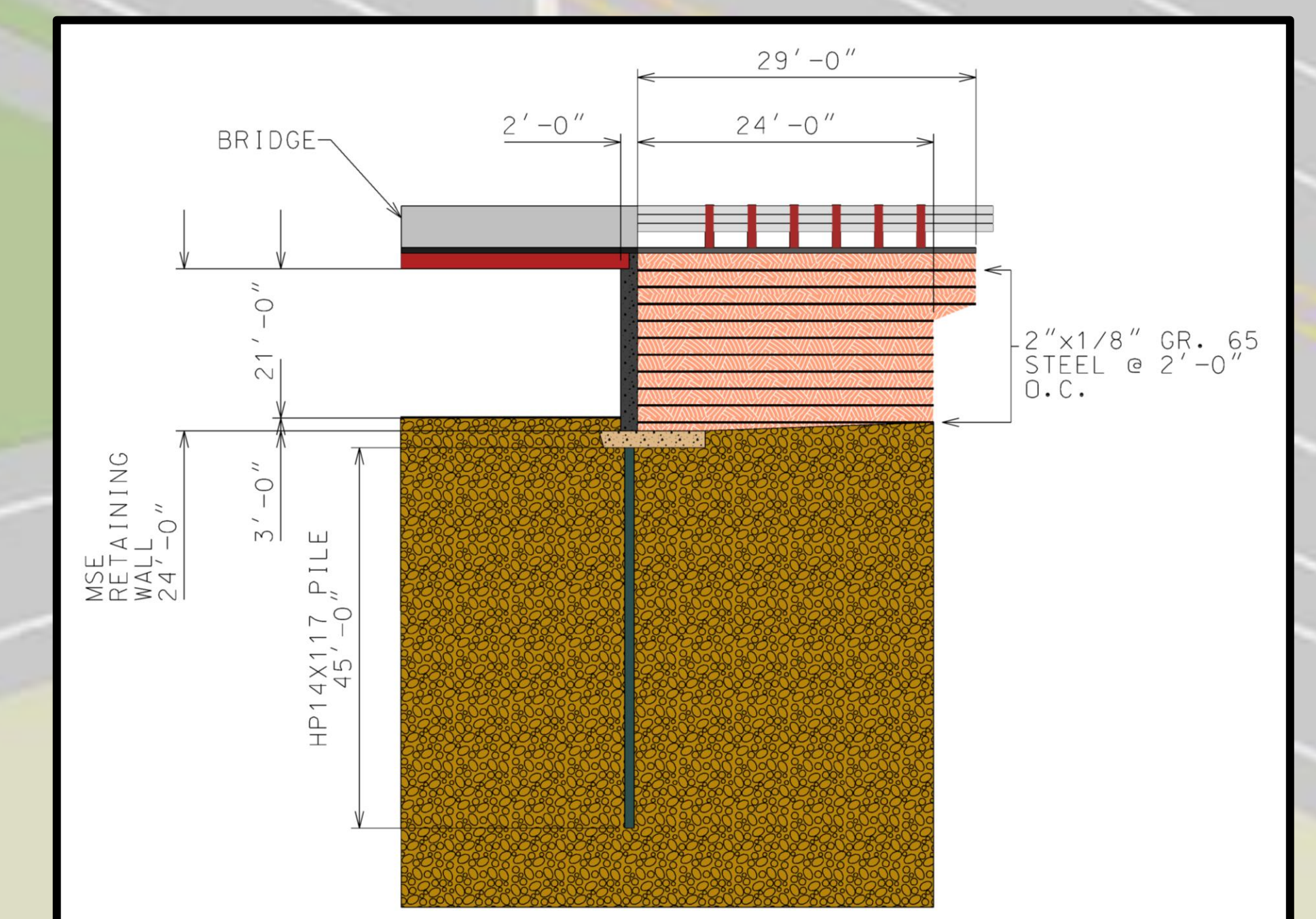


Catchments/Retention Ponds – Location and layout of the four catchments and four retention ponds.

GEOTECHNICAL

The geotechnical design included:

- Two 195 ft. Mechanically Stabilized Earthen (MSE) retaining walls integrated with abutment foundations supported by driven piles.
- Analysis of soil bore logs to determine allowable bearing capacity.



Abutment/Retaining Wall – Layout of abutment/retaining wall, steel reinforcements, and driven piles.