

## IOWA DEPARTMENT OF TRANSPORTATION

**TO OFFICE:** Design **DATE:** February 12, 2010  
**ATTENTION:** Michael Kennerly **REF.:** Identify County  
**FROM:** Section Engineer **Project Number**  
**OFFICE:** Design  
**SUBJECT:** Design Exception, Route number, Description of Project.

The purpose of this memorandum is to document design exceptions for the Interstate 29 corridor improvements currently under development in the Sioux City area. This project is located on Interstate 29 from 1.5 miles south of the Riverside Boulevard Interchange north to the Big Sioux River (Segment 3). Construction on this project involves reconstruction of the Interstate from Station 583+20 to Station 688+88.69 (Big Sioux River) to a six-lane interstate with an enclosed paved median, concrete barrier and storm sewer.

### Existing Roadway Characteristics

Interstate 29 is classified as an interstate route and is a service level "A" roadway. The existing Interstate is a four-lane urban Interstate separated by a concrete median barrier from Station 583+20.00 to Station 634+04.60; and a four-lane rural Interstate from Station 634+04.60 to Station 688+88.69. Design traffic estimates are 34,900 AADT in 2010 and 57,000 in 2030 with 11 % trucks.

This proposed project meets current design standards for a six lane urban/rural interstate facility except as noted below.

### Specific Design Criteria Not Met

We are requesting a design exception for reduced shoulder widths in the northbound median, reduced shoulder constant cross slope width due to intakes in the northbound and southbound median, reduced shoulder width due to sign footings in the northbound and southbound median, and reduced shoulder width adjacent to the northbound outside lane. The reason for this request is to reconstruct the new roadway within the existing width limitations of the Big Sioux River and existing bike trail on the south side of the roadway and the existing Right-of-Way, sanitary sewer, railroad and bluffs on the north side of the existing alignment.

AASHTO's "A Policy on Design Standards Interstate System" states 12 foot shoulder widths should be considered for six-lane interstates when the truck directional design hourly volume (DDHV) is greater than 250. The truck DDHV for this project exceeds 250. The six-lane typical median width (10' shoulder - 10' median pad - 10' shoulder) for the corridor is shown in Figures 1 and 2. These widths allow for more than 12 feet at a constant slope from the edge of the inside driving lane to the face of the median barrier when the median pad is constructed with cross slopes to match the adjacent shoulder cross slopes.

There are four situations within the project where the minimum 12' shoulder is not achieved:

- Situation 1: The available shoulder width at a constant slope is reduced to 10 feet or 8 feet at median intake locations depending on the location due to the flat installation of the RA-47/SW-547 intake grates as shown in Figure 3. Construction of a flat median pad was discussed with Methods and FHWA. However, the median pad cross slopes are desirable for two reasons: first, the cross slopes provide for additional storm water "storage" and reduce spread on to the pavement; second, the cross slopes increase the available shoulder width at a constant slope from 10' to 13.88' (8' to 11.88') at locations not having an intake.
- Situation 2: The total median width is reduced from 30 feet to 28 feet (10' shoulder - 10' median pad - 8' shoulder), from Stations 587+ 10 to 628+00 as shown in Figures 1 and 2, to minimize and/or avoid impacts to the existing deep sanitary sewer longitudinal to the interstate; and adjacent to, but outside the existing Right-of-Way. The median shoulder width available in the northbound median shoulder at a constant slope is 11.88'.
- Situation 3: The northbound outside shoulder width is reduced from 12' to 10' from Stations 592+70 to 629+40 to minimize and/or avoid impacts to the existing sanitary sewer.
- Situation 4: The available median shoulder width is reduced at Stations 600+00, 612+50, and 618+00 to accommodate sign truss footings in the median. At sign truss locations, the concrete median barrier is bumped out around the footing and encroaches on the available median shoulder width as shown in Figure 4.

### Alternatives Considered

Alternatives considered included:

- Acquiring additional ROW containing the previously constructed sanitary sewer. The Iowa Department of Transportation's Policy For Accommodating and Adjustment of Utilities on the Primary Road Section 115.16(2) (Prohibitions on Longitudinal Occupancy) states "A utility facility shall not be used for transmitting gases or liquids or for transmitting products that are flammable, corrosive,

expansive, highly energized or unstable". Therefore, it is undesirable to acquire additional ROW containing the previously constructed sanitary sewer.

- Relocating the sanitary sewer. Relocation of the sanitary sewer is undesirable due to the existing sanitary depth, the railroad, the new city water transmission line in the railroad right-of-way, and the bluffs. Cost of relocating the sanitary sewer is estimated to be \$2,100,000 if there was a feasible location in the corridor to place the sanitary sewer.
- Shifting the proposed alignment of the roadway. Shifting the proposed alignment of the roadway is difficult due to the river and bike trail constraints.

#### **Comparison of Safety and Operational Performance**

Accident data was tabulated for Interstate 29 Segment 3 from the beginning of project to the end of the project at the Big Sioux River. There were 91 accidents at a cost of \$573,275 during the most current five year accident history period from January, 2004 to December, 2008. Of these accidents: Five involved fatalities, three were major injury accidents, eight were minor injury accidents, ten were possible injury accidents and 65 were property damage only accidents. Included in these accidents are two incidents that parking on the shoulder may have contributed to the accident. One of these was a minor injury accident and one was a property damage only accident.

The crash rate for this section of Interstate 29 is 100 crashes per hundred million vehicle miles traveled. The statewide crash rate average for municipal interstate roadways is 107 crashes per hundred million vehicle miles traveled.

The benefits of this project are increased traffic capacity, new pavement, safety enhancements, and new pavement markings.

#### **Proposed Mitigation Measures**

No mitigation measures were considered since no adverse impacts resulting from the design exception are anticipated. New pavement and pavement markings, along with other safety enhancements, will offset the impacts of reduced shoulder width.

#### **Compatibility with Adjacent Sections**

No impacts on safety and operation performance of adjacent roadway sections are expected.

#### **Conclusion/Recommendation**

We recommend final design and construction continue on the Sioux City Interstate 29 corridor improvements utilizing a design exception for the noted substandard shoulder widths as noted. The statewide crash rate for this segment of Interstate 29 is currently less than the statewide average. New pavement, pavement markings, and safety enhancements associated with this project will improve both the safety and operational performance of this segment of roadway.

Your concurrence is requested for using these design exceptions and to use participating Federal-aid funding for this project. If you need additional information, please advise.

Approved: \_\_\_\_\_  
Director, Office of Design

Date: \_\_\_\_\_

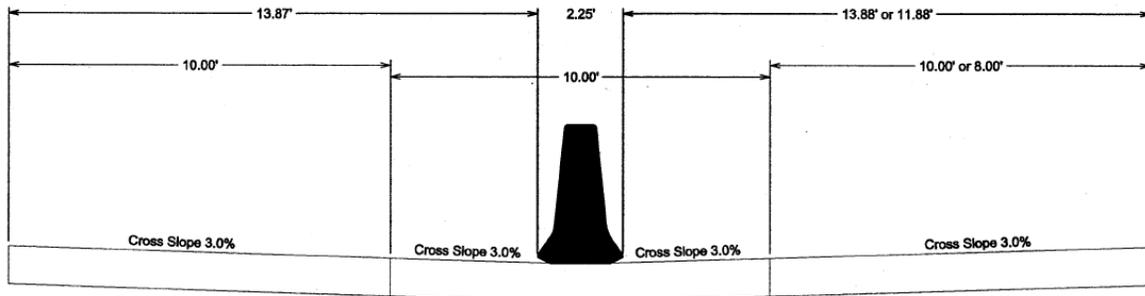
Approved: \_\_\_\_\_  
Office Director

Date: \_\_\_\_\_

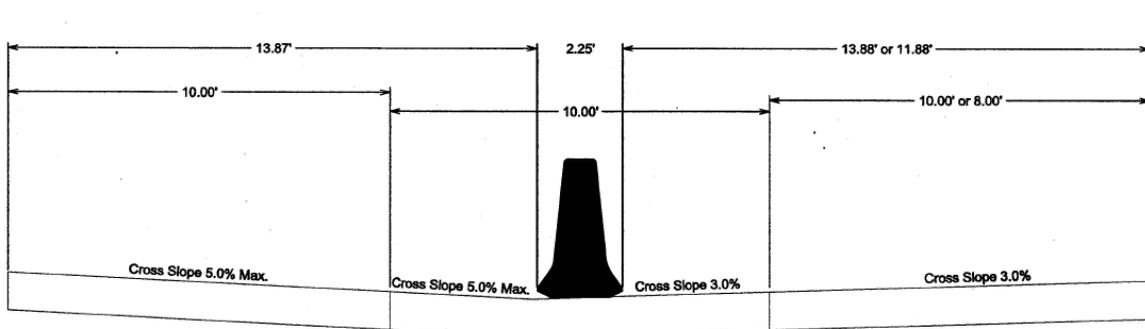
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FHWA

Date: \_\_\_\_\_

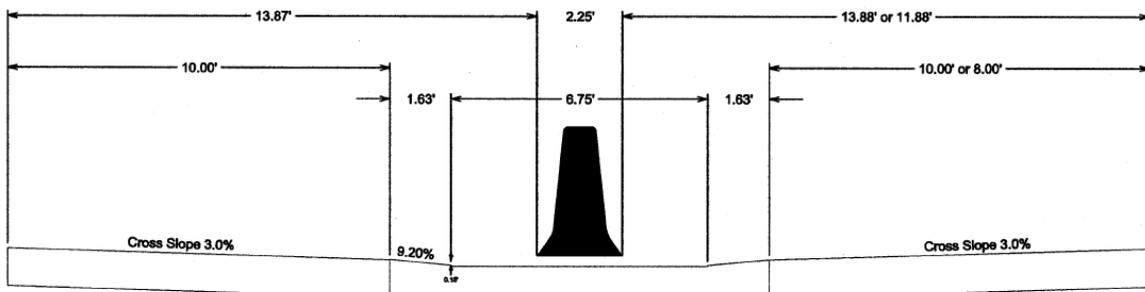
**PROPOSED MEDIAN**



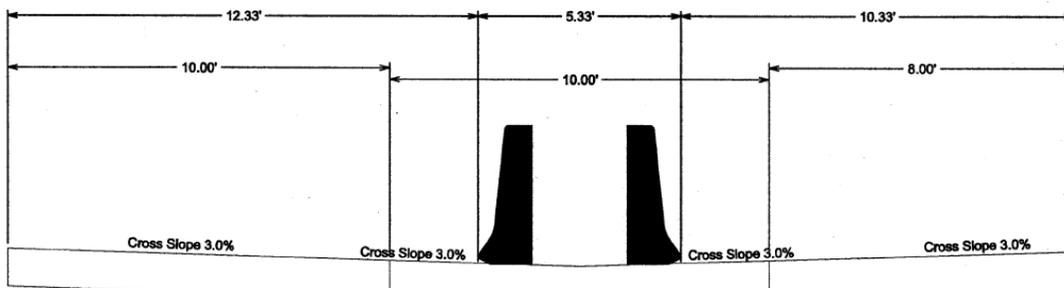
**Figure 1:  
30' or 28' Median w/ no Superelevation (Tangent Sections)**



**Figure 2:  
30' or 28' Median w/ Superelevation (Curved Sections)**



**Figure 3:  
30' or 28' Median at Intake Locations  
(Situations 1 & 2)**



**Figure 4:  
28' Median w/ no Superelevation  
(Situation 3)**