



UDOT Median Barrier Selection Process

March 6, 2012

Notes:

- *This process is not intended to define the need for barrier, rather to standardize the type of barrier selected when barrier is required.*
- *Use of glare screen is by site specific study only and is not covered by this process. Contact the Traffic and Safety Operations Engineer.*
- *All current UDOT Standards are NCHRP 350 compliant. Test Level as per NCHRP 350.*
- *Test Level 5 cast-in-place constant slope barriers are acceptable per February 14, 2000 FHWA "Report 350 Nonproprietary Guardrails and Median Barriers" memo from Dwight Horne, Director of Office of Highway Safety Infrastructure.*
- *Test Level (TL) defined: A set of conditions, defined in terms of vehicle mass, vehicle impact speed, and vehicle impact angle, that quantifies the impact severity of a matrix of tests.*
 - *Test Level 3: Tests up to a 4,400 lb vehicle impacting at speeds up to 62 mph and at approach angles up to 25 degrees.*
 - *Test Level 5: Tests up to a 79,400 lb vehicle impacting at speeds up to 50 mph and at approach angles up to 15 degrees.*

Barrier Selection Process:

1. UDOT median barrier reference information:

- a. Roadside Design Guide:
 - i. Accepted as UDOT's resource per the Roadway Design Manual of Instruction
 - ii. Chapters 6 and 10 (barrier warrants sections)

- b. Use UDOT Standard Drawings (BA series) for location and installation requirements
- c. Overview of median barrier:
 - i. On freeways and other roadways with medians:
 - 1. Median width is less than 50 feet
 - 2. Posted speed is 45 mph or more
 - ii. Crossover crash rate exceeds the expected value for the facility. See the operational safety report
 - iii. Recommended by UDOT Traffic and Safety

2. Review options for barrier type selection:

- a. Test Level 3 barriers:
 - i. Median cable barrier
 - ii. 30” median barrier W-beam guardrail
 - iii. 32” precast concrete full barrier standard shape (New Jersey shape)
 - iv. 42” precast concrete constant slope barrier
 - v. 42” cast-in-place constant slope barrier
 - vi. 54” cast-in-place constant slope barrier
- b. Test Level 4 barriers: Parapets for use on bridges only, as per UDOT Structures Division guidance
- c. Test Level 5 barriers:
 - i. 42” cast-in-place constant slope barrier
 - ii. 54” cast-in-place constant slope barrier

3. Determine Test Level required:

- a. Test Level 3, or higher, is required for all medians with barrier
- b. Test Level 5 is required for:
 - i. Site specific locations when needs justify Test Level 5. Use items one through four of the “UDOT Test Level 5 Barrier Warrants/Approval Request Form” to determine if Test Level 5 barrier should be considered. Examples of site specific needs may include:
 - 1. Crash history
 - 2. Roadway geometrics (e.g., long downgrade with horizontal curves)
 - 3. High AADT and truck volumes
 - ii. Column protection:
 - 1. Use when required by AASHTO Load and Resistance Factor Design (LRFD) in median and/or shoulder applications to protect bridge columns
 - 2. See UDOT Standard Drawing BA 1E for more information
 - 3. Consult with the bridge engineer assigned to the project

4. Determine barrier type::

- a. Test Level 3:
 - i. Use cable barrier unless another type is justified due to:
 - 1. Compatibility with existing site (drainage, median width constraints, existing site grading, etc.)
 - 2. Roadway geometric considerations or crash history
 - 3. Deflection and redirection capabilities

- ii. When higher performance barrier is justified, determine barrier type based on:
 - 1. Life cycle cost considerations (see appendix):
 - a. Expected service life
 - b. Initial construction costs
 - c. Expected repair rates based on hit rates and severity
 - d. Anticipated salvage and removal costs
 - 2. Corridor consistency
 - 3. Need for an integrated gawk screen on urbanized freeways. Use 54" cast-in-place constant slope barrier
- b. Determine height of Test Level 5 barrier:
 - i. Use 42" unless 54" cast-in-place constant slope barrier is justified due to:
 - 1. Matching adjacent barrier height
 - 2. Concerns of trucks affecting opposing traffic
 - 3. Need for an integrated gawk screen on urbanized freeways
 - 4. Column protection:
 - a. Use 54" cast-in-place constant slope barrier when required by AASHTO Load and Resistance Factor Design (LRFD) in median and/or shoulder applications to protect bridge columns
 - b. See UDOT Standard Drawing BA 1E for more information
 - c. Consult with the bridge engineer assigned to the project

Appendix: Reference Information to Assist in Barrier Selection

Costs updated February 2012

See UDOT average bid costs in PDBS for current information

Expected Service Life

Cast-in-place or precast barrier 40 years

Cable barrier 30 years

W-beam guardrail..... 30 years

Hit Repair Costs (use actual historical costs where possible)

Cast-in-place

Large vehicle (truck).....\$15,000 per hit
(30 feet total replacement – loose steel cut free and tied into both ends)
Small vehicle (car/SUV).....\$0 per hit

Precast

Large vehicle (truck).....\$3,900 per hit
(3 barrier segments replaced and 8 segments reset)
Small vehicle (car/SUV).....\$1,900 per hit
(1 barrier segments replaced, 4 segments reset)

Cable

Large vehicle (truck).....\$750 per hit
(6-20 posts replaced – requiring 2 man hours)
Small vehicle (car/SUV).....\$250 per hit
(3-6 posts replaced – requiring 1 man hour)

Construction Costs

Cast-in-place.....\$65 to 135 per ft
Precast\$45 to 55 per ft
Cable\$13 to 17 per ft

Hit Rate Ranges (use actual historical and anticipated hit rates where possible)

Urban

Large vehicle (truck).....0.4 to 0.8 hits/mile/year
Small vehicle (car/SUV).....5.0 to 7.0 hits/mile/year

Rural

Large vehicle (truck).....0.1 to 0.3 hits/mile/year
Small vehicle (car/SUV).....1.0 to 3.0 hits/mile/year