Appendix C
Glossary of Aesthetic Design Elements

Glossary of Aesthetic Design Elements

The purpose of this section is to provide you a vocabulary of terms that define some of the design elements used in a transportation facility. Design elements are the physical objects that serve a needed function, such as lighting or structural support, and that can be given aesthetic treatments.

Understanding the individual elements is the foundation for a successful design of the whole highway facility. The elements included in this glossary are:

- Bicycle-Pedestrian Facilities
- Gateways and Way-finding
- Lighting
- Retaining Walls
- Traffic Barriers
- Bridges
- Lids
- Railings and Screens
- Sound Walls

For each element, we briefly describe the purpose of that element, discuss performance standards (if any), and offer a list of "Questions to Ask" that will help in creating an integrated aesthetic character.

Performance standards are rules or guidelines that help transportation planners and designers create safe, efficient transportation facilities. The American Association of State Highway and Transportation Officials (AASHTO) is chiefly responsible for guidelines that cover a broad range of transportation-related design elements for roads, bridges, and trails. While not binding, these guidelines have been incorporated into the official standards and policies of state, county, and local agencies throughout the country. These guidelines are the basis for the Washington Department of Transportation's LAG (local agency guidelines) Manual, which provides policies and standards for all local agencies using Federal Highway Administration (FHWA) funds for transportation projects. The Corridor Aesthetics Handbook has considered safety and function (as detailed in AASHTO guidelines) as fundamental parts of the project's planning and design.

Bicycle-Pedestrian Facilities

Bicycle-pedestrian facilities are paths that are typically separated from motorized roadways by a vertical structure of some kind or landscaping. There are many ways to design such facilities to meet a defined need and set of users, fit with the landscape and terrain, and help users orient themselves as they travel.

Performance Standards

AASHTO standards for trails address safety and accessibility by establishing categories of trails and paths ranging from unpaved hiking trails to wheelchair paths. For each category the standards specify how much curve is permitted for a given speed, how steep the trail can be, how the trail is paved, what markings are needed for intersection crossings, and much more.

OBJECTIVES

1. Enhance the non-motorized transportation potential of the bicycle-pedestrian facilities. This facility will be a vital addition to the existing regional trail system, but its design should also be integral with all design elements alongside it in the corridor, including retaining walls, sound walls, roadside barriers, landscaping, lids, transit stops, and local trail connections.
2. Create secure and safe areas. Safety and comfort can be created through the use of night lighting, avoiding traps or snags where someone might come to harm, and good overall visibility to and from the path. Lighting is essential in tunnels.
3. Minimize conflicts between different trail user groups; consider separating bicyclists and pedestrians.
4. Educate users about and promote regional nonmotorized travel options.

QUESTIONS TO ASK

1. How can we situate the path relative to retaining walls and sound walls to isolate users from traffic noise and provide access to nice views or other out-of-corridor connections?
2. How can we use landscaping and grading to shelter the path from wind, rain, and traffic noise, and to enhance recreational quality?
3. How can we design and locate sign and light supports and railings to meet the needs of the shared use path and motor vehicle users in the shared corridor?
4. How can we integrate the trail with new lids and with recreational and open space systems?
5. How can we coordinate the trail with transit stops, bike storage facilities, and local walkways?
6. How should way-finding and interpretive signage be used on the project?

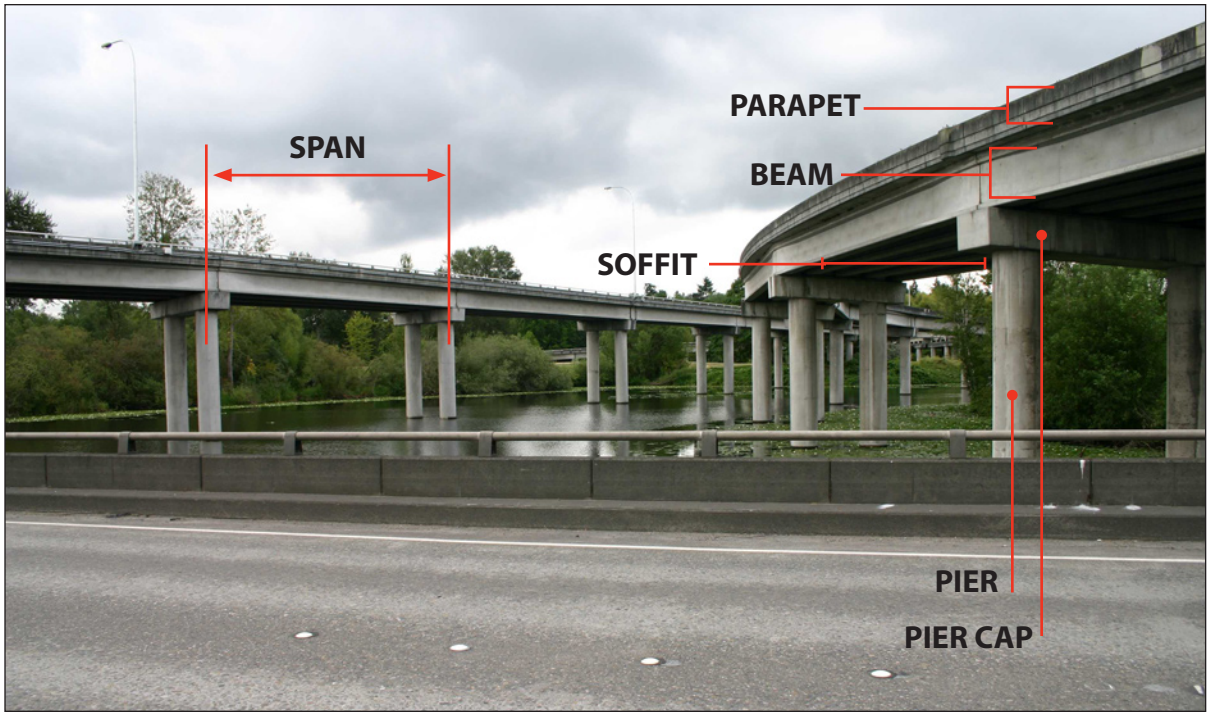
Bridges

Bridges come in many styles and materials, but the terrain and environment will largely determine which style and materials are used. Bridge types already in the SR 520 project are box-girder and floating pontoon.

Bascule

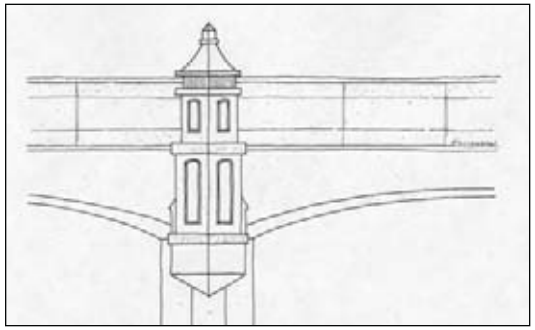
Concrete Girder

Pontoon Floating



Performance Standards

Bridge-building is a highly evolved technology and there are many performance standards that are rigorously applied. Each component of a bridge structure must conform to well-established criteria for strength, durability, and quality as established by the relevant technology (e.g., steel, concrete, wood).



OBJECTIVES

1. Consider how the design of the bridges can enhance or articulate the visual and aesthetic coherence of the whole corridor.
2. Consider how the aesthetic appearance of an individual bridge would best fit the location. Should the bridge defer to its surroundings or be a grand statement? Should the bridge be individualistic and stand out or graceful and in harmony with its surroundings?
3. Balance corridor unity and local individuality by attending to the transitions between the two.
4. Select and coordinate the aesthetic treatments of the bridge components and surrounding landscapes so they contribute to or create a coordinated aesthetic effect.
5. Identify regional and local gateway bridges and use aesthetic treatments to announce and celebrate the entry threshold of a neighborhood, city or region.

QUESTIONS TO ASK

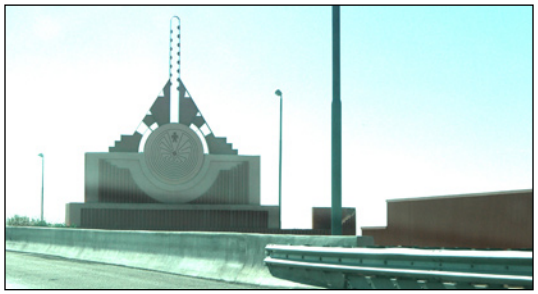
1. What is the preferred aesthetic quality and presence for the family of SR 520 bridges?
2. What is the preferred aesthetic quality and presence for each individual bridge?
3. How can we meld the aesthetic unity of the corridor with local personality at bridges?
4. How can we determine which bridges could be landmarks or gateways?
5. How can we design the piers supporting the bridges over water to enhance or blend with the places where they stand?
6. How can we design bridges to preserve the views of travelers on the bridge as well as neighbors looking towards the bridge?
7. How can we design the bridges to preserve views on the ground for pedestrians, cyclists, and others?
8. What opportunities exist for landscaping at bridges?
9. How can we design the roadway landscape to reflect corridor unity?
10. How can we design the landscape of maintenance building to screen the facility?
11. How can we design the new land bridges to include landscaping?

Gateways and Way-finding

Gateways announce a threshold of or arrival at a destination, usually a town or city, and convey a sense of the community or culture. Way-finding elements identify places of interest, provide information about those places, and provide directions to those places at decision points like junctions or nodes. Unlike highway signage, way-finding elements tend to reinforce a sense of place and help to aesthetically connect the roadway corridor and neighboring communities.

Performance Standards

Gateway and way-finding elements must meet the performance standards and functional requirements of the structure that they assume, such as a sign or a stone monument. They should not create distractions such as glare or movement, since dynamic or interactive features might distract a driver's attention. Town names or other text can be used on surface streets, while the highway right-of-way is reserved for transportation signage.



OBJECTIVES

1. Design a gateway or way-finding element to be appropriate to the scale of the surroundings and the speed of the viewers.
2. Ensure that gateway features will not distract drivers, but will provide location identification.
3. Coordinate gateway and way-finding features with other necessary highway safety and operational information.

QUESTIONS TO ASK

1. Where would we like to use way-finding to provide directional or educational information?
2. What is the proper size for a way-finding element in order that it is noticeable yet not distracting?
3. Where can we include local identity images or titles?
4. How can we design a regional gateway to convey the importance of the threshold?
5. What themes would best convey sense of regional threshold?
6. How can those themes support a corridor identity?
7. How can we design a local gateway to reinforce a sense of individuality and place?
8. How can we design an interchange landscape to contribute to the gateway aesthetic?

Lids

The term "lid" is short for "lidded highway" because lids are just very wide bridges that cover a length of highway. Also called "cut and cover", lids are constructed by digging a trench for the road bed then covering part of the trench with a lid. This means that lid design is strongly driven by the surface terrain. Because lids provide extensive surface area they can carry paths and trails, landscaping, and small structures.

Performance Standards

The same standards that apply to bridges apply to lids because lids are basically bridges placed side by side. Since the interior is tunnel-like, tunnel standards for lighting, ventilation, fire suppression, and emergency access also apply. Vehicle exhaust becomes trapped in the tunnel and must be mechanically vented if the lid's length or curves prevent natural ventilation. The thickness of the lid depends on what the lid must support.

OBJECTIVES

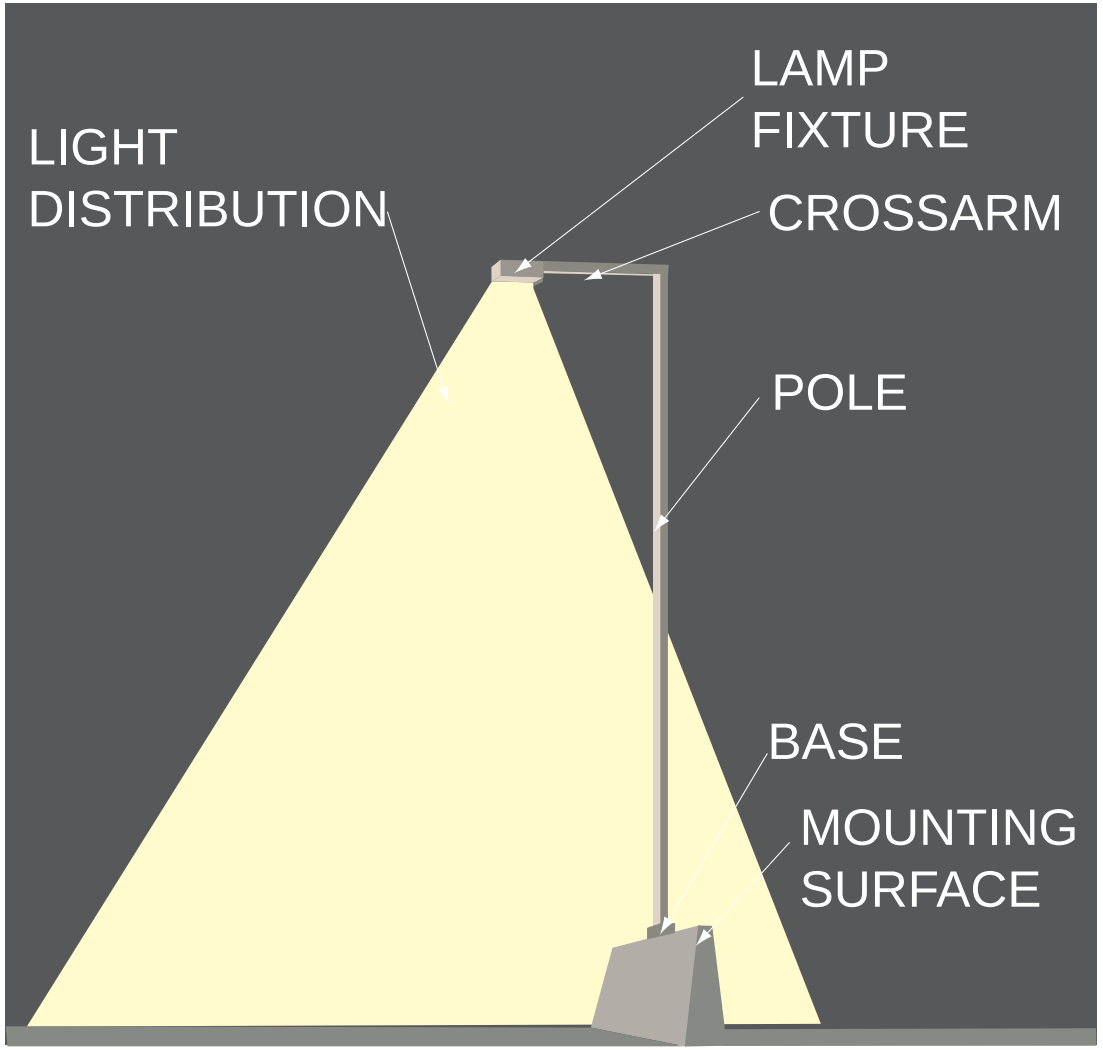
1. Design the lid surface features to create a safe and useable part of the community.
2. Determine ideas for how to use each lid on an individual basis. Some lids are appropriate for passive recreation and parks, and to provide viewpoints. Other lids may incorporate stairs, escalators, or elevators to a highway level transit stop.
3. Enhance neighborhood connections to each other, to parks, schools, trails, or other activity centers.
4. Ensure that any features on top of the lid, such as railings or vehicle barriers, meet applicable standards.

QUESTIONS TO ASK

1. Can lids accommodate open space amenities or passive recreation fields?
2. How can we design a lid surface that provides connections to local the activity centers?
3. What kind of path would best serve the users of those activity centers?
4. How should we design the junctions between connecting paths and activity centers to make a graceful transition to the character of those centers?
5. How shall we design a lid landscape to be consistent with, mitigate, or enhance the surroundings?
6. How should we design the surface of the lid to enhance views of special regional or local scenes?
7. How can we design furnishings and structures (stairs, railings, etc.) to enhance transit facilities located under or near the lid?
8. What should structures such as elevator buildings (if necessary) look like, either to reflect local personality or corridor unity?
9. What are the long term maintenance and sustainability issues associated with a lid?

Lighting

Lighting is used to create safer, more comfortable roads, sidewalks, parking lots, and trails by improving visibility at night or in dark areas such as tunnels.



Performance Standards

Lighting standards have been tested and refined through years of research and performance reviews in highway and roadway applications. In addition to federal highway standards, cities and counties may also have lighting guidelines or regulations that must be considered. Standards typically address spacing, height, spectrum, brightness, and glare. The FAA requires collision-avoidance navigation safety lights on tall structures to warn aircraft and on bridges and boat channels to alert water craft of obstacles in their path.

OBJECTIVES

1. Consider whether light standards could reflect special community character and provide a unifying aesthetic theme.
2. Coordinate aesthetic design with safety and visibility needs for trails and the bicycle-pedestrian path.

QUESTIONS TO ASK

1. How can we best illuminate the bicycle-pedestrian path to create good nighttime visibility without creating unwanted glare or bright spots?
2. What should the color and style of light fixtures and poles be to reflect local individuality?
3. How shall we coordinate the lighting elements with railings, walls and other elements to create an intentional, integrated aesthetic appearance?
4. How should we establish a hierarchy of lighting that differentiates between different use areas (e.g., highway, crossing arterials, minor roads, pathways, bus stops, or bike trails) and be part of a way-finding system?
5. How will the lighting inside tunnels created by lids be coordinated with the materials on the interior of the tunnel?
6. Can the lighting in a natural area, if present, be made unobtrusive so that wildlife and fish are not affected?

Railings and Screens

Railings are guardrails for pedestrian safety, either to prevent vehicles from crossing into a pedestrian area or to prevent a person from falling over an edge. Screens prevent pedestrians from throwing objects onto the roadway below.

Performance Standards

Pedestrian railings are required where pedestrians or nonmotorized users can come within 5 feet of edges that have a drop-off of 30 inches or more. Railings must be at least 42 inches high with picket spacing less than 4 inches. Railings that are adjacent to bicycle traffic must be at least 48 inches high and should be designed to reduce the danger of snagging handle bars.

OBJECTIVES

1. Use railings to bring thematic color, texture, and a human-scale level of design to a road system. Railings can be the finishing touches to larger elements, such as transit access stairs or ramps, or may provide continuity to a trail/path network or landscape.
2. Consider the function of the area where a railing would be required. A viewpoint on a lid may dictate a low visibility rail that doesn't detract from the view, whereas a bridge rail may be designed to include sculptural forms and color.
3. Coordinate railing and screen design with the family of roadway appurtenances, i.e., fences, sign and light supports, and furnishings.
4. Use railings and screens as canvasses for expressing a larger concept or theme.

QUESTIONS TO ASK

1. Where are railings going to be visible and to whom?
2. How should we design a railing system to contribute to the overall aesthetic character of the surroundings?
3. How can we design a "family" of railings and screens for pedestrian paths, transit stops, bridges or lids, and other uses?
4. What materials, surface treatments (such as galvanizing or painting), and aesthetic detailing should or could be used for each railing system or screen?

Retaining Walls

Retaining walls hold back soil and rock substrates and may also provide support for structures on top of those substrates, such as roads or fences. Concrete is the preferred material because it is easy to work with, adaptable, and strong. Concrete walls can either be poured in place using forms or assembled from panels that are cast elsewhere and shipped to the site. Other materials that are characteristic of our region are blocks of basalt, cut and rough granite and stone, and field and river stones.

Performance Standards

The most fundamental requirements are to contain and support soil and loads without slipping, tipping, or cracking, and to allow moisture and water to escape. Walls are engineered for each location and additional features, such as surface treatments and finishes, must not interfere with the fundamental job of retaining earth. Where retaining walls rise up from the road bed, the base of the wall must serve as a traffic barrier and meet all highway safety requirements.

OBJECTIVES

1. Create a distinctive corridor character by using color, texture, patterns, or facings on the surface of the walls facing the highway where they can be seen by motorists.
2. Mitigate or soften views of walls seen by the neighborhood by vegetative screens or surface treatments that reflect local character.
3. Coordinate retaining walls with sound walls, barriers, bridges, and other structures to create a distinctive, seamless corridor identity.
4. Avoid monolithic expanses of wall by integrating landscaping into wall structures where possible. Trees and shrubs can screen retaining walls and reduce their apparent scale, and vines can also be grown on walls to soften them and change their color.
5. Avoid high maintenance treatments.

QUESTIONS TO ASK

1. How shall we design the highway wall surfaces to reflect corridor unity?
2. How shall we design the outside wall surface to mitigate changed views or reflect community identity?
3. How should we design the highway walls so they are interesting and distinctive but not distracting for drivers?
4. How can we avoid monolithic structures by including offsets and landscaping?
5. How will the design reflect attention to the details of the wall including coping, transitions to other walls or structures, and joints and seams?
6. How can we design the shape of the wall so that it changes smoothly and rhythmically along the roadway?
7. How can we design well coordinated and attractive intersections between retaining wall and other walls or structures?
8. How can we design the top of the wall and termination points to be attractive parts of the wall?

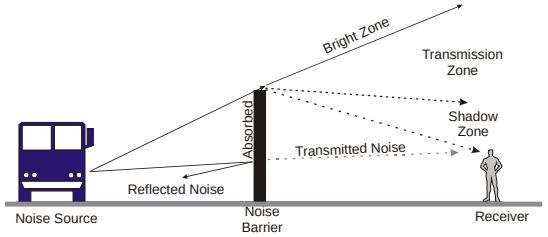
Sound Walls

Sound walls are free-standing barriers installed between noise generators (vehicles) and noise receptors (people who live or work near the roadway). Sound walls reduce the perceptible level of noise outside the roadway by reflecting or absorbing sound from vehicles inside the roadway. In the U.S., sound walls are usually concrete, from 4 to 10 inches thick.

Performance Standards

1. Noise mitigation is required for highway projects that result in noise levels that are greater than existed prior to completion of the project or that exceed thresholds established by regulation. The intent of the regulations is to protect sensitive receptors such as people in hospitals, schools, and residences.
2. The noise environment that exists prior to construction of a new highway is determined by a combination of on-site noise monitoring and data from other sources. These data are fed into mathematical models that calculate how tall the wall should be and approximately where it should be placed.
3. For maximum noise reduction, the barriers are either placed close to the noise generator or close to the receptor. Any holes or gaps in the wall will allow sounds through to the protected side.
4. Proper and carefully detailed construction is essential to ensure that walls do not seep, crack, or move.

Sources



Sound waves can bend around corners [diffract] and scatter [reflect] into new paths. Because of this the barrier should be located as close as possible to either the source or the receiver.

For every 3 feet of height above the line of sight, a plain concrete noise wall reduces the noise by about 1.5 db.

In comparison, a 100-foot wide band of trees and understory shrubs reduces noise by 3 to 5 db.

Noise is generated at different places on the vehicle, therefore the height of the "effective" noise source is different for each vehicle type.

PASSENGER VEHICLES

Noise occurs mainly at the tire or wheel-roadway interface, or from 0 to 2 feet above ground.

MEDIUM TRUCKS

Delivery trucks, large SUVs, buses with under-vehicle exhaust, etc.

Noise is produced by a combination of tire-roadway interface and engine exhaust. The equivalent noise source is from 2 to 5 feet above ground.

HEAVY TRUCKS

Long-haul tractor-trailers, dump and cement trucks, etc.

Noise is produced by a combination of tire-roadway interface, engine, and exhaust noise, resulting in an average noise source that is approximately 8 feet above ground.

OBJECTIVES

1. Avoid high maintenance materials.
2. Ensure that new sound walls are designed to be integral with retaining walls, barriers, and bridge or lid abutments.
3. Ensure that the walls are not monolithic and continuous.
4. Consider working with artists to create surface treatments that reflect a design concept or theme.

QUESTIONS TO ASK

1. How shall we design the highway wall surfaces to reflect corridor unity themes?
2. How can we use pattern, color, line, or texture to create a pleasant driving experience that is not distracting for motorists?
3. How can we include step backs, niches, or terraced and staggered wall placement to permit plantings of vines, shrubs, and/or trees and avoid a monolithic appearance?
4. What will the wall surface facing away from the highway look like, if visible?
5. How will the design reflect attention to the details of the wall including coping, transitions to other walls or structures, and joints and seams?
6. Can we design the shape of the wall so that it changes smoothly and rhythmically along the roadway?
7. How can we design well coordinated and attractive intersections between sound wall and other walls or structures?
8. How can we design the top of the wall and termination points to be attractive parts of the wall?
9. What sort of maintenance is required to preserve the surface aesthetic treatments?

Traffic Barriers

Barriers are used to ensure that vehicles don't cross over the center of the roadway or leave the outside of the roadway. Barriers are designed to minimize the chance of injury to passengers in vehicles by redirecting or absorbing the energy of the collision. There are three basic types of barriers:

Concrete barriers are the most durable and rigid of the barrier types, and are the most effective of the three at stopping vehicles. They are frequently used as medians to separate directions of traffic when there is limited room for a landscape or other open median. They are also used at the outside edges of roadways where there is limited space or where the roadway edge is defined by a wall.

W-beam guardrails are used both to separate directions of traffic and at roadway edges where there is room for a safety area.

Cable barriers are most often used in the middle of wide landscaped medians to prevent crossover accidents.

Performance Standards

The use and placement of traffic barriers are determined by safety requirements. Barrier designs have been tested and refined through years of research and performance reviews in highway applications. The size, shape, and materials of each individual barrier type cannot be changed without extensive testing to ensure that the barrier meets its required safety functions.

OBJECTIVES

Integrate the traffic barriers aesthetically with retaining and sound walls by considering surface treatments that do not impair meeting performance standards.

QUESTIONS TO ASK

1. Would aesthetic treatments such as surface textures or colors be possible and if so, at which locations?
2. How can we coordinate barriers with other design elements, including walls, railings, and planting areas?
3. Can landscaped medians be combined with traffic barriers?

Part 4: References

Federal Highway Administration (FHWA). "Flexibility in Highway Design", 1997.
This document identifies and explains the opportunities, flexibilities, and constraints facing designers and design teams responsible for the development of transportation facilities.

WSDOT. Context Sensitive Design/Thinking Beyond the Pavement.
http://www.wsdot.wa.gov/eesc/design/Urban.htm.

WSDOT. Roadside Manual. 1998.
This manual provides coordination between all WSDOT partners responsible for roadside activities, and to establish a common basis for consistent roadside management decisions statewide.

WSDOT. Understanding Flexibility in Transportation Design-Washington. April 2005. J. Milton and A. St. Martin (eds.),
This new publication was developed to help those involved with transportation project development understand the concepts related to Context Sensitive Design (CSD) and community-based project development approaches.