Florida Department of Transportation

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PROJECT MANAGEMENT BULLETIN 14-01
ROADWAY DESIGN BULLETIN 14-02
STRUCTURES DESIGN BULLETIN 14-03

(FHWA Approved: January 30, 2014)

DATE: January 30, 2014

TO: District Secretaries, District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Construction Engineers, District Geotechnical Engineers, District Structures Design Engineers, District Consultant Project Management Engineers, District Maintenance Engineers, District Environmental Administrators, District Project Development Engineers

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SUBJECT: Perimeter Walls

This bulletin supplements Engineering and Operations Memorandum 13-03 and implements standardized requirements for the design and use of Perimeter Walls. Please note that there is no change to any existing noise wall policy, procedure or process other than consistency in terminology. See the Background section of this bulletin for more information.

REQUIREMENTS

1. Add the following new section to the ***Project Development and Environment (PD&E) Manual***, Part 2, Chapter 15:

15-2.1.2: PERIMETER WALLS

This section establishes guidelines for the consistent statewide application and inclusion of perimeter walls on department projects.

The request for consideration of a perimeter wall must come from the local municipality in which the project is located or from a group of directly affected residents/property owners adjacent to the project. These requests should be documented in the project file as early in the project's life as possible, i.e., during the PD&E phase of the project. If a request for perimeter wall consideration has been made, it is the responsibility of the environmental office Project Manager to forward the request to the appropriate design staff/project manager to ensure complete follow through on the request.

Perimeter walls are not intended to provide any noise reduction, nor are they intended to serve as a substitute for noise barriers at locations where a noise analysis has determined that the construction of noise barriers is not feasible and cost reasonable. Perimeter walls are not intended to be used as mitigation for environmental impacts. Perimeter walls will not be considered as a retrofit for existing conditions, and shall only be given consideration when a minimum of one of the following conditions are met:

1. Expanding the capacity of an existing highway by adding lanes to the outside of the existing travel lanes;
2. The significant alteration (as defined in the ***PD&E Manual***) of the vertical or horizontal alignment of an existing highway;
3. A new highway on a new alignment;
4. The removal of existing extensive vegetation or other visual barrier within the FDOT right-of-way;
5. Exceptions to any of the items listed above will be considered on a case by case basis by the Assistant Secretary of Engineering and Operations.

If at least one of the above conditions is met, further consideration for the construction of a perimeter wall can proceed. The following requirements must also be met:

1. Building permits for the structures on the adjacent land that would realize a benefit from the perimeter wall must be issued prior to the approval of the project's environmental documentation.
2. Traffic on the project roadway must be visible from the adjacent property.
3. The structure for which the perimeter wall is being considered must be immediately adjacent to the FDOT's right-of-way (ROW) and within 150 feet of the edge of the nearest travel lane. Additionally, the perimeter wall must be constructible within the FDOT's ROW or an easement must be granted to facilitate construction, if necessary.
4. The perimeter wall must be continuous, with no openings to accommodate driveways or other access requirements.
5. The cost of the perimeter wall shall not exceed $25,000 per adjacent land owner. A unit cost equal to 2/3 that of a noise wall (currently $30/ft^2) shall be used for estimating and programming purposes.
6. The height of a perimeter wall is limited to eight feet.
7. A simple majority of the adjacent property owners must support the construction of the perimeter wall.

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2. Add the following sentence to the ***Project Management Handbook***, Part 1, Chapter 9, at the end of the Project Development and Environment (PD&E) Studies section:

- Have any local municipalities or resident/property owner groups requested a perimeter wall for their community along the corridor?

3. Add the following three paragraphs to the ***Project Management Handbook***, Part 1, Chapter 9, at the end of the Context Sensitive Design section:

An example is Perimeter Walls: The purpose of a perimeter wall is to provide a separation between a highway and adjacent land users to maintain the quality of life that existed prior to the construction of a highway project and are not assumed to provide any measurable noise reduction benefits. Benefits of perimeter walls may include, but are not limited to, minimizing visual impacts, providing a visual screen when existing vegetation is removed, providing separation to adjacent land owners, maintaining access control restrictions, and others. In recent years perimeter walls have been constructed as part of several projects due to the negative impact on residents living near the road improvement when noise walls were not justified in an effort to preserve the quality of life for those affected.

The decision to include perimeter walls within a project is not automatic and requires input from a local municipality or land owner(s). The initial assessment for the use of a perimeter wall should typically be performed during the Project Development and Environment (PD&E) process and only when such a wall is requested by a local municipality or a substantial group of affected residents/property owners. The results of the perimeter wall analysis shall be documented in a Perimeter Wall Justification Report. This is a standalone report and is not part of any environmental document. Final decisions made during the Design Phase will be added to the report by addendum. The final decision for the use of a perimeter wall should be made during the Design Phase when the final conditions and cost are available for consideration.

To assure that the use and costs of perimeter walls are consistent across the state, guidelines containing the process and design methodologies to be used when considering the use of perimeter walls can be found in the ***Plans Preparation Manual***, Volume 1, Chapter 32.

4. Add the following two paragraphs to the ***Project Management Handbook***, Part 2, Chapter 2, at the end of the Project Development Summary Report (PDSR) section:

Perimeter Wall Justification Report. The initial assessment for the use of a perimeter wall should typically be performed during the Project Development and Environment (PD&E) process and only when such a wall is requested by a local municipality or a substantial group of affected residents/property owners. The results of the perimeter wall analysis shall be documented in a Perimeter Wall Justification Report. This is a standalone report and is not part of any environmental document. Final decisions made during the Design Phase will be added to the report by addendum. The final decision for the use of a perimeter wall should be made during the Design Phase when the final conditions and cost are available for consideration.

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To assure that the use and costs of perimeter walls are consistent across the state, guidelines containing the process and design methodologies to be used when considering the use of perimeter walls can be found in the ***Plans Preparation Manual***, Volume 1, Chapter 32.

5. Replace the first paragraph of the ***Project Management Handbook***, Part 2, Chapter 3, Structures Design section with the following:

Many design projects include structures such as bridges, culverts, sign and signal supports, retaining walls, noise walls or perimeter walls. Additional structures design information and references can be found in ***PPM,*** Volume 1, Chapters 26 through 33, and on the Structures Design Office website.

6. Add the following paragraph to the ***Project Management Handbook***, Part 2, Chapter 3, at the end of the Local Government Coordination section:

- Perimeter Wall requests and agreements: The initial assessment for the use of a perimeter wall should typically be performed during the Project Development and Environment (PD&E) process and only when such a wall is requested by a local municipality or a substantial group of affected residents/property owners. The final decision for the use of a perimeter wall should be made during the Design Phase when the final conditions and cost are available for consideration. If a perimeter wall is proposed, the Department will approach the local government during the Design Phase of the project to seek concurrence on the incorporation of the perimeter wall into the project. The local government will be responsible for obtaining support from the majority (simple majority) of the adjacent residents/property owners prior to construction of a perimeter wall. FDOT will work closely with the local municipality to determine final wall locations, color, texture, etc. For walls located on non-FDOT owned lands, the local government or land owner assumes the responsibility for all maintenance, including structural repairs. The local government or land owner will provide formal concurrence with the recommendation (resolution or letter) and a Maintenance Agreement for the perimeter wall, if applicable. To assure that the use and costs of perimeter walls are consistent across the state, guidelines containing the process and design methodologies to be used when considering the use of perimeter walls can be found in the ***Plans Preparation Manual***, Volume 1, Chapter 32.

7. Replace ***Plans Preparation Manual (PPM)***, Volume 1, Chapter 32 with the following:

(Please note: This is a complete chapter replacement to incorporate the perimeter wall policy and design process into the chapter. There is no change to any existing noise wall requirement, policy, procedure or design process. The only noise wall related ***PPM*** changes are for consistency in terminology (term “noise wall” in place of “noise barrier”) and a condensed description of the requirements of ***Section 479.25***, ***Florida Statutes*** (***F.S.***).)

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Chapter 32 Noise Walls and Perimeter Walls

32.1 General Requirements

32.1.1 Noise Walls

Chapter 23 of the ***Code of Federal Regulations Part 772 (23 CFR 772)*** entitled "Procedures for Abatement of Highway Traffic Noise and Construction Noise" contains the federal regulations for the assessment of traffic noise impacts and abatement on federal aid projects. Chapter 335.17 of the ***Florida Statutes*** requires the use of ***23 CFR 772*** for traffic noise impact assessment on highway projects, regardless of funding The policy for abatement of traffic noise on Department projects and the requirements for assessing the noise impacts and abatement commitments are detailed in FDOT's Noise Policy (Part 2, Chapter 17 of the ***Project Development and Environment Manual (PD&E Manual)*** (Topic No. 650-000-001)). The initial evaluation of noise impacts is made during the Project Development and Environment (PD&E) phase of a project. Any preliminary commitments to provide reasonable and feasible noise abatement measures on a project are included in the Noise Study Report (NSR) and summarized in the environmental document. The environmental documents and any subsequent re-evaluations shall be reviewed to identify all preliminary noise abatement commitments.

Preliminary noise abatement commitments made during the PD&E phase are subject to change due to refinements during final design. Designers must consider final roadway grades and horizontal alignments, land use changes, as well as ground elevation at noise wall locations. Noise abatement identified as reasonable and feasible during the PD&E phase needs to be reassessed against the final roadway features. The typical PD&E phase assumptions are appropriate for reasonableness and feasibility decisions but the final design must utilize location specific data that reflects proposed vertical and horizontal locations of the travel lanes and noise walls. The noise specialist shall provide the top of noise wall elevation for both minimum and desirable insertion reductions as described below. The designer shall coordinate with the noise specialist in the District Environmental Management Office to ensure proper analysis and public involvement occurs during final design.

Modification for Non-Conventional Projects:
Delete the above paragraph and replace with the following: See the RFP for noise wall requirements. If an Alternative Technical Concept is proposed that changes the horizontal or vertical alignments depicted in the Concept Plans, any associated required changes to the noise wall locations must also be addressed. Any modifications/additions to noise wall location and height requirements depicted in the RFP shall be assessed by the Department based on the information provided by the design-build firm and are subject to Department approval. Reassessment of the noise study shall be performed by the Department as necessary. The Design-Build Firm shall coordinate with the noise specialist in the District Environmental Management Office to ensure proper public involvement occurs during final design.

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If no noise abatement is identified in the environmental document or any subsequent environmental re-evaluations, no further effort is required during final design. However, it may still be necessary to evaluate construction noise and vibration impacts and develop any Special Provisions to be included in the plans.

Modification for Non-Conventional Projects:
Delete the above paragraph and replace with the following: If noise walls are not specified in the RFP, no further effort is required during final design. However, it may still be necessary to evaluate construction noise and vibration impacts and develop any Special Provisions to be included in the plans.

Upon review of the environmental documents the designer and the noise specialist should identify the noise receptors considered during the noise impact assessment performed in PD&E. Noise receptors resulting from development completed after the approval date of the environmental documents should not be considered as the Department is not responsible for providing noise abatement at these sites. A detailed design reassessment of the preliminary noise abatement commitments should be conducted for the following:

1. Locations of preliminary noise abatement commitments
2. Receptor sites where roadway geometric refinements are likely to change noise impacts

An addendum to the NSR (NSRA) prepared by the District Environmental Management Office during Final Design will document the final noise abatement commitments.

Modification for Non-Conventional Projects:
Delete the above two paragraphs and replace with the following: Any NSRA prepared during a Design-Build project shall be prepared by the Department. See the RFP for requirements.

See ***Structures Design Guidelines***, Section 1.4.5 for the policy on noise wall surface finishes.

32.1.2 Perimeter Walls

The purpose of a perimeter wall is to provide a separation between a highway and adjacent land users to maintain the quality of life that existed prior to the construction of a highway project and are not assumed to provide any measurable noise reduction benefits. Benefits of perimeter walls may include, but not be limited to, minimizing visual impacts, providing a visual screen when existing vegetation is removed, providing separation to adjacent land owners, maintaining access control restrictions, and others. These recommendations are not intended to mandate the use of perimeter walls in any instance and are to be considered only as a guide to aid in engineering decisions made on the project. Perimeter walls are not to be considered for retrofitting existing conditions where

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highway improvements are not proposed, for mitigation of environmental impacts or for buildings that received a building permit after approval of the Categorical Exclusion, the Finding of No Significant Impact (FONSI), the Record of Decision, State Environmental Impact Report (SEIR) of Non-major State Action (date of public knowledge) for a project, unless an exception is granted by the Assistant Secretary of Engineering and Operations, on a case by case basis. Perimeter walls may be considered around FDOT facilities such as rest areas, weigh stations, etc., to provide a positive separator between the facilities and the adjacent land uses.

The initial assessment for the use of a perimeter wall would typically be performed during the Project Development and Environment (PD&E) process and only when such a wall is requested by a local municipality or a substantial group of affected residents/property owners. The final decision for the use of a perimeter wall would be made during the Design Phase when the final conditions and cost are available for consideration.

The results of the perimeter wall analysis shall be documented in a Perimeter Wall Justification Report. This is a standalone report and is not part of any environmental document. Final decisions made during the Design Phase will be added to the report by addendum.

The following steps provide a general overview of the process to consider requests for perimeter walls:

1. **Considerations for a Perimeter Wall Assessment**

   Perimeter walls will be considered in areas requested by a local municipality or group of directly affected residents/property owners and where a perimeter wall is deemed to offer benefit to the adjacent land use. Perimeter walls shall only be considered on the project types listed below and shall not be considered for resurfacing, operational, highway safety, maintenance, emergency, or enhancement projects. The following are projects where perimeter walls may be considered and only when the distance from the edge of the travel lane to the closest portion of the adjacent structure is equal to or less than 150 feet:

   - The capacity of an existing highway is expanded by adding lanes to the outside;
   - Horizontal and/or vertical alignment of an existing highway is significantly altered as defined in the ***PD&E Manual***;
   - A highway on new location;
   - Existing extensive vegetation or other visual barriers are removed.

2. **Factors Considered for a Perimeter Wall Recommendation**

   If any of the above criteria are met, the Department will evaluate the following factors to determine if a perimeter wall would be considered for the project:

   - Functional Classification (Access Controlled Urban Arterials, freeways)
   - Adjacent land uses (highly residential, schools, recreation areas)

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- View of traffic from the adjacent land use. If the traffic on a road is not visible from the adjacent land use, a perimeter wall will not be considered.

The following feasibility factors should be considered: constructability, safety, cost, access, drainage and utility conflicts. Perimeter walls may also be considered when FDOT is granted an easement to facilitate the construction of the wall. Perimeter walls shall not be considered if additional Right of Way must be acquired to incorporate the wall into a project. Perimeter walls will not be recommended across the frontage of properties with closely spaced driveways that will require multiple openings on the wall. See ***Structures Design Guidelines***, Section 3.18 for additional limitations on where perimeter walls may be located.

The cost of providing the perimeter wall shall not exceed $25,000 for each adjacent land owner. Include the cost of relocating existing utilities that must be done so as to construct the perimeter wall in this cost. Only lands immediately adjacent to the ROW will be considered for perimeter walls.

To assure consistent application of these guidelines, partial or complete funding from third party sources will not be accepted and no custom designs are allowed.

3. Local Municipality Concurrence

If a perimeter wall is proposed, the Department will approach the local government during the design phase of the project to seek concurrence on the incorporation of the perimeter wall into the project. The local government will be responsible for obtaining support from the majority (simple majority) of the adjacent residents/property owners prior to construction of a perimeter wall. FDOT will work closely with the local municipality to determine final wall locations, color, texture, etc. For walls located on non-FDOT owned lands, the local government or land owner assumes the responsibility for all maintenance, including structural repairs. The local government or land owner will provide formal concurrence with the recommendation (resolution or letter) and a Maintenance Agreement for the perimeter wall, if applicable.

Modification for Non-Conventional Projects:
Delete ***Section 32.1.2*** and replace with the following: See the RFP for perimeter wall requirements. If an Alternative Technical Concept is proposed that changes the horizontal or vertical alignments depicted in the Concept Plans, any associated required changes to the perimeter wall locations must also be addressed. Any modifications/additions to perimeter wall location requirements depicted in the RFP shall be assessed by the Department based on the information provided by the Design-Build Firm and are subject to Department approval. The Design-Build Firm shall coordinate with the District Environmental Management Office to ensure proper public involvement occurs during final design.

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32.2 Noise Study Report Addendum

The primary effort related to the reassessment of preliminary noise abatement commitments during design is the preparation of an addendum to the NSR. The reassessment shall be based on the final roadway geometry and the proposed noise abatement design, including noise wall type, location, dimensions and estimated costs. For consistency, the Final Design reassessment should be conducted using the latest version of the FHWA's Traffic Noise Model (TNM).

Noise abatement measures are considered when noise levels at a receptor(s) approach or exceed the noise abatement criteria or substantially exceed existing noise levels. The noise abatement criteria is listed in Table 32.1. Approaching the criteria means within 1 dB(A) of the noise abatement criteria. A predicted increase of 15 dB(A) or more is considered substantial. Noise abatement is considered for Activity Categories A, B, C, D and E only. Preliminary noise abatement commitments are documented in the original NSR.

An NSR Addendum is not required for perimeter walls.

Modification for Non-Conventional Projects:
Insert the following sentence at the beginning of ***Section 32.2***: The NSRA shall be prepared by the Department.

32.3 Noise Abatement Criteria

The insertion loss is the level of noise reduction as a result of abatement. The desirable insertion loss is 10 dB(A) or more; however, the minimum insertion loss should be 5 dB(A) or more for at least two (2) impacted residential receptors to be considered for abatement to be considered reasonable. Additionally, at least one (1) benefited receptor at each noise wall location must meet the noise reduction design goal of 7 dB(A) or more to be considered reasonable. If a noise wall can meet the desired insertion loss for a cost of $42,000 or less per benefited receptor site, the wall is considered cost reasonable. The statewide average unit cost (per square foot) and the upper limit of the cost per benefited receptor to be used in determining cost reasonableness is established by the Environmental Management Office. As of the printing of this update the statewide average unit cost of noise walls to be used in the calculation of the cost/benefited receptor is $30.00/ft^2. The ***PD&E Manual*** should be referenced for the latest unit cost update. Additional costs such as required additional right of way, special drainage features, special bridge support and special foundations associated with the installation of a noise wall should be added to the unit cost if appropriate. If these special features increase the cost per benefited receptor above $42,000, the decision whether or not to provide a wall must be made in consultation with the District Environmental Management Office and FHWA (if appropriate). Any decision to eliminate a noise wall from consideration based on the additional cost of special features will require clear demonstration that the need for such special features are associated only with the noise wall and cannot be mitigated by other considerations.

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If a minimum of 5 dB(A) insertion loss cannot be achieved at a receptor, that receptor is not benefited; therefore, it cannot be considered in the cost effective calculation to determine the reasonableness of that noise wall. The noise specialist should thoroughly investigate the scenarios required to meet the desirable insertion loss of 10 dB(A) at $42,000 or less per benefited receptor particularly where design changes or the consideration of special features require cost or abatement level reanalysis.

Under normal conditions noise walls shall not exceed the following heights:

1. For ground mounted noise walls use a maximum height of 22 feet. Non-crash tested noise walls within the clear zone require shielding.
2. For noise walls on bridge and retaining wall structures use a maximum height of 8 feet unless a taller noise wall is specifically approved in writing by the State Structures Design Engineer.

Modification for Non-Conventional Projects:
Delete condition #2 above and replace with the following: 2. For noise walls on bridge and retaining wall structures use a maximum height of 8 feet unless otherwise specified in the RFP.

3. For ground mounted Traffic Railing/Noise Wall combinations use a maximum height of 14 feet.

Use of noise wall heights greater than these shall require a Design Variation and project specific designs. Justification for a variation should include, as a minimum, a description of site conditions requiring the increased height and a comparison to the standard height of both insertion loss and cost per benefited receptor.

The noise specialist should provide analytical results to the Department project manager evaluating noise wall heights necessary to achieve minimum, desired and optimum insertion loss. The optimum noise wall height is the most cost effective in consideration of noise reduction benefits per unit cost of the noise wall. An evaluation matrix is suited to this type of comparative analysis. The evaluation matrix should consider an appropriate range of noise wall configurations (height, length and roadway offset) that provide the desirable insertion loss (10 dB(A)) per impacted receptor and the minimum insertion loss (5 dB(A)) per impacted receptor and the noise reduction design goal of 7 dB(A). The number of benefited receptors should be identified and the cost per benefited receptor calculated for each configuration evaluated. If a noise wall configuration can provide the desirable insertion loss (10 dB(A)) at a reasonable cost (less than $42,000 per benefited receptor), then it should be provided. If this is not achievable, the noise specialist should select a noise wall configuration that optimizes insertion loss per impacted receptor and cost per benefited receptor. The noise specialist should always provide a recommendation with the evaluation. The noise specialist should also coordinate with the District Structures Design Office to ensure that the noise wall design meets appropriate structural design standards and that construction is feasible and achievable.

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The height of the noise wall is measured from the ground elevation to the top of the noise wall. Tall noise walls are seldom necessary at the top of roadway embankments or berms since the elevation of the embankment contributes to the effective height of the noise wall. In addition, changes in the vertical grade of the top of the noise wall should be gradual and abrupt changes in wall heights should be avoided. Often natural ground elevations at the base of the noise wall fluctuate, even in flat terrain. Therefore, the designer, in conjunction with the noise specialist, should provide plan details that make clear to the contractor the final top of wall elevations, post spacing and foundation step locations. See the ***Instructions for Design Standards*** for ***Design Standards*** Index 5200 Series for additional requirements.

When an otherwise continuous noise wall is broken resulting in a horizontal separation between the wall sections, it is often necessary to overlap the wall sections to reduce insertion loss degradation. Applications of this occur when the mainline noise wall is located at the right of way line, but must be moved to the shoulder point at a bridge location. This may also occur at interchanges when transitioning from the mainline to a ramp. The overlap distance of noise walls is generally equal to four times the separation; however, an analysis by the noise specialist is necessary to determine the optimum overlap. The need or effectiveness of a noise wall in the infield area of an interchange should be reviewed as well during final design. The attenuation of ramp traffic may provide adequate insertion loss when considering the intersecting roadway's noise contribution. Maintenance access, clear zone and line of sight must be considered when selecting noise wall termini details.

Other noise abatement techniques that may be considered to supplement or replace noise walls are:

1. Traffic management measures (e.g., traffic control devices and signing for prohibition of certain type vehicles, time use restrictions for certain type vehicles, modified speed limits, and exclusive lane designations);
2. Alteration of horizontal and vertical alignments;
3. Acquisition of property rights for construction of noise walls by donation, purchase or condemnation;
4. Acquisition of the balance of a noise-sensitive property from which there is a taking, if acquisition is less expensive than other methods;
5. Acquisition of real property to create a buffer zone; and
6. Noise insulation of Activity D land uses.

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Table 32.1 Noise Abatement Criteria

NOISE ABATEMENT CRITERIA [Hourly A-Weighted Sound Level-decibels (dB(A))]				
Activity Category	Activity Leq(h)[1]		Evaluation location	Description of activity category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E[2]	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	–	–	–	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	–	–	–	Undeveloped lands that are not permitted.

*(Based on Table 1 of **23 CFR Part 772**)*

[1] The Leq(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.
[2] Includes undeveloped lands permitted for this activity category.

Note: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

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32.4 Public Involvement

32.4.1 Noise Walls

The identification and design of noise abatement measures during the project design phase will require additional public involvement efforts and will be especially important in the establishment of noise wall design features such as wall texture. Public coordination is often necessary to finalize wall locations, heights and aesthetic features, especially if there are substantial changes to prior commitments. These changes may be the result of any of the considerations noted in ***Section 17-4*** of the ***PD&E Manual***. Coordination with the District Public Involvement or Community Liaison Coordinator in obtaining additional input during the final design of the noise wall is required.

When a noise wall is warranted, a written survey shall be conducted to establish whether a numerical majority of the benefited receptors are in favor of the construction of the noise wall. If they are not in favor, the Department may choose not to build it. If agreement cannot be reached by a neighborhood on the use of noise walls, the decision to provide them or not will rest solely with the Department. This survey will usually be conducted during the design phase although it is possible that a survey could be conducted during the PD&E phase. Survey issues should be coordinated with the District Environmental Management Office.

Noise walls located on arterial roadways can potentially impact access. The ability to construct an effective noise wall(s) can depend on an individual property owner's willingness to sign a right of way indenture allowing access to be cut off or modified. For these type projects it is general practice to obtain a written statement from each affected property owner demonstrating support for the noise wall. If an adjacent property owner(s) declines to sign the indenture the noise specialist shall re-evaluate the effectiveness of noise abatement on the project segment considering alternate noise wall layouts. If insertion loss criteria cannot be met, the noise specialist shall document in the NSR Addendum that the noise wall is not feasible.

F.S. 479.25 "Erection of noise-attenuation barrier blocking view of sign; procedures; application", provides procedures and requirements for allowing permitted, conforming, lawfully erected outdoor advertising signs to be increased in height if visibility is blocked due to construction of noise walls (or "noise attenuation barriers" as referred to in the statute). In addition, the statute provides procedures that address various coordination requirements (such as notification requirements, survey requirements, public hearing requirements, and approval requirements) for the involved parties (which include the Department, the local government or local jurisdiction, and the benefited receptors (or "impacted property owners" as referred to in the statute)). Please refer to ***Part 1, Chapter 11 Public Involvement***, of the ***PD&E Manual*** for additional details about meeting notification requirements.

32.4.2 Perimeter Walls

Public involvement for perimeter walls may follow a similar approach as is used for Noise Walls, except that the Noise Study Report and NSR Addendum are not required, and noise abatement and attenuation criteria are not applicable.

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The identification and design of perimeter walls during the project design phase will require additional coordination with the local government, may require public involvement efforts and will be especially important in the establishment of perimeter wall project requirements such as wall texture. Public coordination is often necessary to finalize wall locations and aesthetic features, especially if there are substantial changes to conditions or previously requested needs. Coordination with the local government and the District Public Involvement or Community Liaison Coordinator in obtaining additional input during the final design of the perimeter wall is required.

When a perimeter wall is proposed, the Design Project Manager will approach the local government during the design phase of the project to seek concurrence on the incorporation of the perimeter wall into the project. The local government will be responsible for obtaining support from the majority (simple majority) of the adjacent residents/property owners prior to construction of a perimeter wall. If they are not in favor, the Department may choose not to build it. FDOT will work closely with the local municipality to determine final wall locations, color, texture, etc. For walls located on non-FDOT owned lands, the local government or land owner assumes the responsibility for all maintenance, including structural repairs. The local government or land owner will provide formal concurrence with the recommendation (resolution or letter) and a Maintenance Agreement for the perimeter wall, if applicable.

For perimeter walls, decisions related to the identification and design of a perimeter wall (identified in the Perimeter Wall Justification Report (PWJR)) will be amended by the design Project Manager in a PWJR Addendum during the design phase. The addendum should document the final decision on whether or not to use a perimeter wall at the requested location(s). The addendum should also document perimeter wall project requirements, commitments or agreements made during the design phase related to a requested perimeter wall, as well as any changes in site or project conditions that may have occurred since the PWJR.

Perimeter walls located on arterial roadways can potentially impact access. The ability to construct perimeter wall(s) can depend on an individual property owner's willingness to sign a right of way indenture allowing access to be cut off or modified. For these type projects it is general practice to obtain a written statement from each affected property owner demonstrating support for the perimeter wall. If an adjacent property owner(s) declines to sign the indenture the Department shall coordinate with the local government to re-evaluate the feasibility of the perimeter wall, and the Design Project Manager shall document in the PWJR Addendum if the perimeter wall is not feasible.

F.S. 479.25 "Erection of noise-attenuation barrier blocking view of sign; procedures; application", provides procedures and requirements for allowing permitted, conforming, lawfully erected outdoor advertising signs to be increased in height if visibility is blocked due to construction of noise walls (or "noise attenuation barriers" as referred to in the statute). Even though ***F.S. 479.25*** is specific to "noise attenuation barriers", if visibility of a permitted, conforming, lawfully erected outdoor advertising sign is blocked due to the construction of a perimeter wall, then the statute will apply (although the noise abatement and attenuation criteria are not applicable). Please refer to ***Part 1, Chapter 11 Public Involvement***, of the ***PD&E Manual*** for additional details about meeting notification requirements.

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32.5 Final Noise Abatement Commitments

During the final design phase, the noise abatement locations, noise wall types, lengths and heights will be determined. The final noise abatement commitments must be documented in the environmental reevaluation and the NSR Addendum prior to construction advertisement. The required data collection, analysis and documentation detailed in ***Part 2, Chapter 17*** of the ***Project Development and Environment Manual*** will be documented in the NSR Addendum. It should also contain a description of the methodology for selecting final noise wall dimensions including any evaluation matrix(s) used.

Modification for Non-Conventional Projects:
Replace the first two sentences of the above paragraph with the following: Any modifications to noise abatement locations, noise wall types, lengths and heights must be documented in the environmental reevaluation and the NSR Addendum prepared by the Department prior to beginning noise wall construction.

A copy of the NSR Addendum, a summary of proposed noise wall and a summary of the public involvement regarding noise abatement that took place during the design effort will be provided to the District Environmental Management Office. The environmental management staff will ensure that the final noise abatement commitments are reflected in the reevaluation of the environmental document and will obtain concurrence from FHWA, if appropriate.

32.6 Contract Plans Preparation

32.6.1 Preparation of Control Drawings

The initial set of drawings to be prepared by the EOR is referred to as Control Drawings. By preparation of these drawings, the EOR shall provide all control parameters such as alignments, limits, notes, etc., and shall provide all the information which is common to all wall types. See the appropriate ***Design Standards*** and the associated ***Instructions for Design Standards (IDS)*** for more information.

32.6.2 Geotechnical Investigation

Once the noise wall location, alignments, height and minimum thickness are determined, or the perimeter wall location and alignments are determined, the soil exploration should be undertaken. The geotechnical engineer should follow the Department's ***Soils and Foundations Handbook*** for exploration.

32.6.3 Use of Design Standards

Designers shall specify the Department's ***Design Standards*** for Noise Walls and Perimeter Walls. Use ***Design Standards Index 5200*** for ground mounted post and panel type Precast Noise Walls or ***Design Standards Indexes 5210 thru 5215*** for Traffic Railing/Noise Wall combinations. Use ***Design Standards Index 5250*** for Perimeter Walls. See the appropriate ***Design Standards*** and ***IDS***

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for more information and limitations of each Index. See ***LRFD Section 15*** and ***Structures Design Guidelines***, Sections 3.16 and 3.18 for the Noise Wall and Perimeter Wall design criteria.

Modification for Non-Conventional Projects:
Delete ***PPM*** 32.6.3 and replace with the following: **32.6.3 Use of Design Standards** Unless otherwise required in the RFP, utilize the Department's ***Design Standards*** for Noise Walls and Perimeter Walls. Use ***Design Standards Index 5200*** for ground mounted post and panel type Precast Noise Walls or ***Design Standards Indexes 5210 thru 5215*** for Traffic Railing/Noise Wall combinations. Use ***Design Standards Index 5250*** for Perimeter Walls. See the appropriate ***Design Standards*** and ***IDS*** for more information. See ***LRFD Section 15*** and ***Structures Design Guidelines***, Sections 3.16 and 3.18 for the Noise Wall and Perimeter Wall design criteria.

32.6.4 Project Requirements

The designer shall establish the project requirements for noise walls based on the analysis and feasible commitments made during the PD&E phase or during the design phase public involvement. Project requirements for noise walls may include color, textures, graphics, use of anti-graffiti coatings, flush vs. recessed panels, etc.

The designer shall establish the project requirements for perimeter walls based on the initial assessment made during the PD&E phase or based on any commitments made during the design phase public involvement. Project requirements for perimeter walls are limited to post cap type, texture, color and the use of anti-graffiti coatings.

The project requirements shall be listed in the Data Tables. See the appropriate ***IDS*** for more information on Data Tables.

Modification for Non-Conventional Projects:
Delete ***PPM*** 32.6.4 and see the RFP for requirements.

8. Add the following line to ***Structures Design Guidelines*** Table 1.4.2-1 in the Superstructure Section:

Component (Precast and Cast-in-Place)	Concrete Cover (inches)
Precast Concrete Perimeter Wall Posts and Panels	1¾

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9. Replace ***Structures Design Guidelines*** 1.4.5.A, B, D and E with the following:

A. The use of smooth uncoated surfaces is preferred for all concrete elements. Textures, striations and/or graphics that are compliant with Department requirements may be used where appropriate at the discretion of the EOR for all structures other than noise, perimeter and retaining walls. Approval by the District Design Engineer (DDE) is required for the use of textures or graphics other than those shown in ***Design Standards*** Index 5200 for retaining walls and noise walls. Allowable textures for the front face of perimeter walls are limited to those used for commercially and readily available masonry blocks. The back face of masonry blocks and precast wall panels used for perimeter walls shall be smooth. Coatings, tints or stains may only be used on specific concrete elements as follows.

B. Except as noted below, when approved by the DDE, Class 5 coatings, tints or stains may be used on bridges and noise, perimeter and retaining walls for which enhanced aesthetic treatments are required because of their close proximity to and/or high visibility from important or popular locations with the following land uses: historical, tourism, commercial, recreational or residential. Approval by the Chief Engineer is required for the use of coatings, tints or stains on all noise walls in non-urban locations and on all structures not specifically listed above.

D. The Department will cover the cost for coatings, tints or stains on bridges and noise, perimeter and retaining walls only as described above. If a Local Maintaining Agency desires a bridge or noise, perimeter or retaining wall with coatings, tints or stains and the structure does not qualify for such treatment as determined by the Department, the structure may be treated with approval by the District Secretary. The Local Maintaining Agency shall provide the additional construction funding for the coatings, tints or stains and shall commit to cover the associated maintenance costs for the service life of the structure.

E. Determine the need for sacrificial or non-sacrificial anti-graffiti coatings based on project specific requirements. Use anti-graffiti coatings on the back face of noise or perimeter walls only if the back face of the wall is immediately adjacent to a public or common area. Coordinate the use of anti-graffiti coatings on other structures and/or in other locations with the District Maintenance Office.

10. Replace ***Structures Design Guidelines*** 2.4.1.D, E and F with the following:

D. Velocity Pressure Exposure Coefficient, $\mathbf{K_z}$

The velocity pressure exposure coefficient, $\mathbf{K_z}$, shall be determined using the following equation:

$$\mathbf{K_z = 2.01(z/900)^{(0.2105)} \geq 0.85} \qquad \text{[Eq. 2-2]}$$

Where:

z = height to centroid of exposed area; for noise and perimeter walls, height to centroid of exposed area in each height zone (ft)

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E. Gust Effect Factor, **G**

The gust effect factor, **G**, shall be taken as:

- 0.85 for bridges with spans < 250 feet and a height < 75 feet
- Bridges with spans > 250 feet or a height > 75 feet - **G** shall be evaluated according to ASCE/SEI 7-05 Section 6.5.8.
- 0.85 for ground mounted noise walls and perimeter walls

F. Pressure Coefficient, $\mathbf{C_p}$

The pressure coefficient, $\mathbf{C_p}$, shall be taken as:

- 1.1 for bridge superstructures
- 1.6 for bridge substructures
- Truss bridges - $\mathbf{C_p}$ shall be determined per the guidelines given in ASCE/SEI 7-05.
- 1.2 for ground mounted noise walls and perimeter walls

11. Replace the title of ***Structures Design Guidelines***, Chapter 3 with the following:

3 SUBSTRUCTURE AND RETAINING, NOISE AND PERIMETER WALLS

12. Add the following new section to the ***Structures Design Guidelines***:

3.18 PERIMETER WALL DESIGN

3.18.1 Scope [15.1]

Design all perimeter walls using the general requirements of ***PPM*** Volume 1, Chapter 32. Design precast concrete perimeter walls and the foundations of masonry perimeter walls using the structural design requirements of ***LRFD*** Chapter 15 as modified by the ***SDG***. Design masonry perimeter walls using the structural design requirements of ACI 530/530.1.

3.18.2 General Features - Panel Height [15.4] and Post Spacing

Typical post spacing measured from centerline to centerline of posts is 20 feet. Use post spacings less than 20 feet only at changes in horizontal alignment, wall terminations or to accommodate steep grades.

Add the following section to ***LRFD*** [15.4]:

Total wall height above the ground line is limited to 8 ft. Precast walls may be built using two equal height panels or a single full height panel.

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3.18.3 General Features - Concrete Strength and Class [15.4]

Add the following section to ***LRFD*** [15.4]:

All precast concrete perimeter wall components shall be Class IV as defined in ***Specification*** Section 346. The concrete cover shall be per ***SDG*** Table 1.4.2-1.

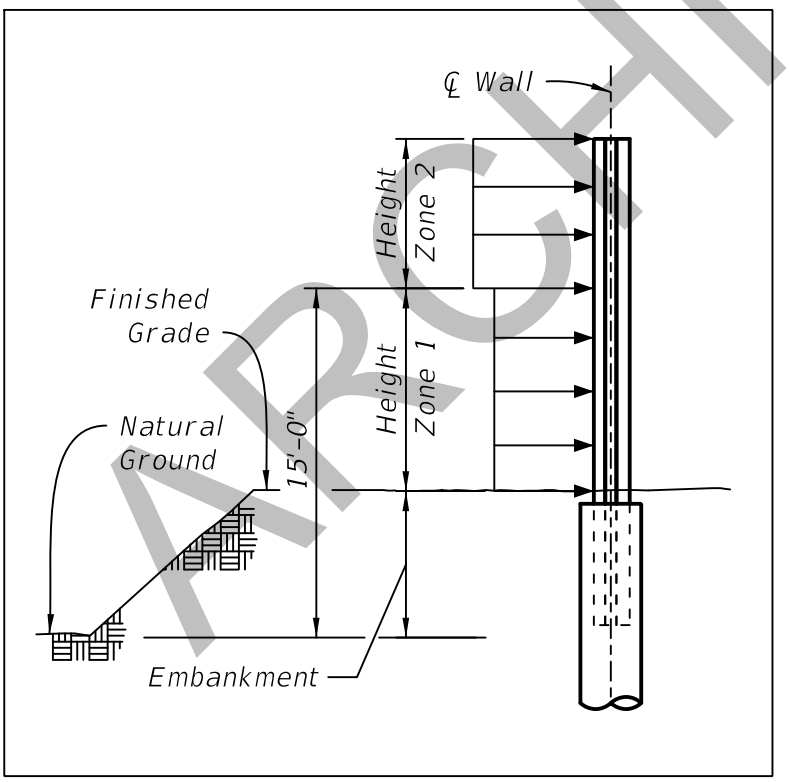
3.18.4 Wind Loads [3.8.1][15.8.2]

For perimeter wall design, replace ***LRFD*** [15.8.2] in its entirety with ***SDG*** 2.4.1.

Height zones for perimeter walls are defined as the exposed height of walls at elevations of 15 feet or less and the exposed height of the wall at elevations greater than 15 feet. See Figure 3.18.4-1.

For perimeter walls located on embankments, the height zones shall be determined by using the elevation of adjoining ground as being the approximate elevation of the original ground surface prior to embankment construction as 0 feet. See Figure 3.18.4-1.

Figure 3.18.4-1 Wind Load Pressures



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3.18.5 Vehicular Collision Forces [15.8.4]

In ***LRFD*** [15.8.4], replace paragraphs 4 thru 9 with the following:

On flush shoulder roadways, locate perimeter walls outside the clear zone, and as close as practical to the right-of-way line. On urban curbed roadways, the front face of the perimeter wall posts shall be a minimum of 4 feet behind the face of the curb. Additional setbacks may be required to meet minimum sidewalk requirements.

3.18.6 Foundation Design [15.9]

Add the following to ***LRFD*** [15.9.1]:

Use the FDOT ***Soils and Foundations Handbook***, Appendix B for design of auger cast piles.

3.18.7 Lateral Earth Pressures [3.11.5.10]

In the first and second sentence of ***LRFD*** [3.11.5.10], change "may be used" to "shall be used".

13. Replace ***Structures Detailing Manual*** 3.1.B and its associated Modification for Non-Conventional Projects Box with the following:

B. Start the sheet numbering with the Key Sheet numbered "B-1". If quantities are required in a component set of plans, place the bridge quantity "BQ" sheets behind the Index/Key Sheet. Begin the quantities sheet numbering with the prefix "BQ1" for quantities associated with the first bridge ("BQ1-1", "BQ1-2", etc.); continue the pattern for the remaining bridges ("BQ2-1" "BQ4-3", etc.), then return to the "B" prefix numbering for sheets with details common to all the bridges. Begin the sheet numbering for the first sheet of the first bridge with "B1-1". Continue to use the "B1" prefix for all sheets with details pertaining to the first bridge ("B1-2", "B1-3", etc.). Number the second series of sheets for the next bridge, if included, "B2-1", "B2-2", "B2-3", etc., continuing to use the "B2" prefix for all sheets of the second bridge. Continue incrementing sheet prefix numbers, "B3-1", "B4-1", etc., for each additional bridge included in the plans. To further divide bridge sheets on complex bridge projects, use a Reference Drawing Number box in the lower right hand corner of the sheet (see ***SDM*** 3.5). After all the bridge plans, place all the wall drawings (including cast-in-place retaining walls, proprietary wall control plans, temporary walls, noise walls and perimeter walls) using a "BW" sheet prefix. To further divide wall sheets by wall number or type, use the Reference Drawing Number box in the lower right hand corner of the sheet (see ***SDM*** 3.5). At the end of the plan set, place all existing bridge sheets for each bridge in one PDF file named "B1ExistingPlans.pdf" for the first bridge (number sheets sequentially "BX1-1", "BX1-2", etc.) and "B2ExistingPlans.pdf" for the second bridge, etc.

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Modification for Non-Conventional Projects:
Delete ***SDM*** 3.1.B and insert the following: B. Start the sheet numbering with the Key Sheet numbered "B-1" and continue to use the "B" prefix for all sheets with details common to all the bridges. Begin the sheet numbering for the first sheet of the first bridge with "B1-1". Continue to use the "B1" prefix for all sheets with details pertaining to the first bridge ("B1-2", "B1-3", etc.). Number the second series of sheets for the next bridge, if included, "B2-1", "B2-2", "B2-3", etc., continuing to use the "B2" prefix for all sheets of the second bridge. Continue incrementing sheet prefix numbers, "B3-1", "B4-1", etc., for each additional bridge included in the plans. To further divide bridge sheets on complex bridge projects, use a Reference Drawing Number box in the lower right hand corner of the sheet (see ***SDM*** 3.5). After all the bridge plans, place all the wall drawings (including cast-in-place retaining walls, proprietary wall control plans, temporary walls, noise walls and perimeter walls) using a "BW" sheet prefix. To further divide wall sheets by wall number or type, use the Reference Drawing Number box in the lower right hand corner of the sheet (see ***SDM*** 3.5). At the end of the plan set, place all existing bridge sheets for each bridge in one PDF file named "B1ExistingPlans.pdf" for the first bridge (number sheets sequentially "BX1-1", "BX1-2", etc.) and "B2ExistingPlans.pdf" for the second bridge, etc.

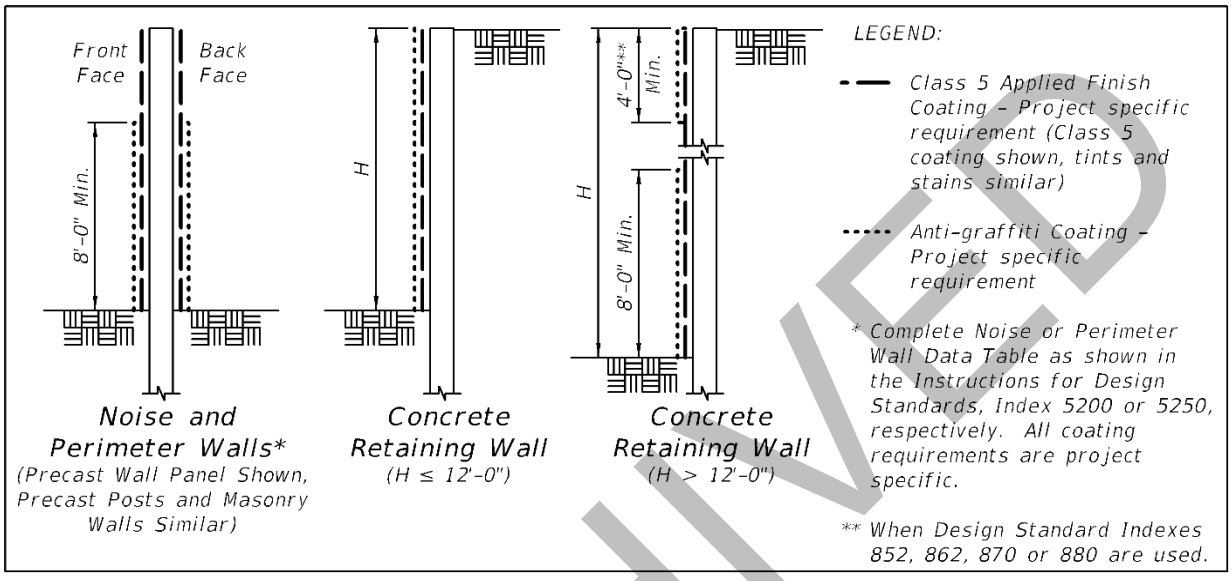
14. Replace ***Structures Detailing Manual*** 4.4.A with the following:

A. If the use of coatings, tints or stains is necessary to meet project specific requirements in accordance with the limitations specified in ***SDG*** 1.4.5, show the limits of the areas to be treated in the plans. See examples of how to depict the limits of treatments in Figure 4.4-1, Figure 4.4-2, Figure 4.4-3 and Figure 4.4-4. For bridges and retaining walls with Class 5 coatings, show appropriate "Class 5 Applied Finish Coating" notes in the General Notes and the corresponding Surface Finish Details on the General Notes drawing. For noise walls, see the ***Instructions for Design Standards*** Index 5200. For perimeter walls, see the ***Instructions for Design Standards*** Index 5250. If the finish color is other than Federal Color Standard No. 595, Color No. 36622 (standard concrete gray) (or Color No. 36642 for uncoated weathering steel bridges), specify the appropriate number(s) for the desired color(s). Do not use generic or brand names for colors, e.g. Pearl Grey. Provide similar notes and details for the use of tints and stains.

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15. Replace ***Structures Detailing Manual*** Figure 4.4-3 with the following:

Figure 4.4-3 Example Surface Finish Depictions on Concrete Noise and Perimeter Walls and Retaining Walls Without Traffic Railings or Parapets



16. ***Design Standards*** Index 5250 Perimeter Walls and the associated ***Instructions for Design Standards (IDS)*** have been released and can be accessed at the Design Standards Revisions (DSR) 2014 website.

BACKGROUND

This bulletin supplements Engineering and Operations Memorandum 13-03.

Perimeter walls have been constructed as part of several projects in recent years due to the negative impact on residents living near the road improvement when noise barriers were not justified in an effort to preserve the quality of life for those affected. To assure that the use and costs of perimeter walls are consistent across the state, guidelines have been developed containing the process and design methodologies to be used when considering the use of perimeter walls.

IMPLEMENTATION

These requirements are effective immediately on all design-bid-build projects in the pre-design phase. These requirements may be implemented immediately on all design-bid-build projects in Design Phase I, II, III or IV at the discretion of the District.

These requirements are effective immediately on all design build projects for which the final RFP has not been released. Design build projects for which the final RFP has been released are exempt from these requirements unless otherwise directed by the District.

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MB/RWC/MS/RVR/CEB

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Florida Department of Transportation

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ANANTH PRASAD, P.E.
SECRETARY

MEMORANDUM

DATE: August 1, 2013

TO: Rob Quigley, State Project Management Engineer

FROM: Robert W. Crim, II, P.E., Manager, Production Support Office

COPIES: Alicia Rudd

SUBJECT: Delegation of Signature Authority

The following list establishes priority for signature authorization in the absence of the Manager, Production Support Office. This authorization includes all documents requiring the signature of the, Manager, Production Support Office WITH THE EXCEPTION of personnel actions and out-of-state travel requests and reimbursements.

1. Rob Quigley, State Project Management Engineer

This memorandum supersedes any previous authorization and shall remain in effect until rescinded by me.

RWC/amr

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