Index 534-200 Precast Noise Walls

Design Criteria

AASHTO LRFD Bridge Design Specifications; ***Structures Design Guidelines (SDG)***; ***Structures Detailing Manual (SDM)***; ***Geotechnical Design Manual* (*GDM*)**

Design Assumptions and Limitations

See ***SDG*** 3.16 for structural design criteria.

This Standard Plan is designed for noise walls outside the clear zone. If noise walls cannot be placed outside the clear zone or a at a minimum of 4 feet behind the top front face of a traffic railing or concrete barrier per AASHTO LRFD BDS Section 15, use Indexes 521-509, 521-510 and/or 521-511 (Traffic Railing/Noise Walls).

General Design Assumptions:

- Wall height is the nominal height of the wall above finished grade. Wall heights range from 12' to 22' in 1'-0" increments with posts spaced at 10' and 20' nominal centers.
- Wall Panel segments are limited to a 12'-0" maximum height and 20' maximum length.
- Wall Panels are the same for all Florida wind zones and total panel height is wall height plus 1 foot.
- Posts are designed to resist wind pressures based on requirements of ***SDG*** 2.4 and ***SDM*** 3.16. Velocity Pressure Exposure Coefficient (Kz) is 1.0 for all standard wall heights and the assumed Drag Coefficient for is 1.2. Top of wall elevations are less than 33 feet above the surrounding terrain.
- Foundation depths are calculated using Broms method for overturning. Soil boring characteristics averaged over a depth of 8 shaft diameters may be assumed per ***NCHRP Report 343*** (pg. 198).
- Foundations in this Index have been designed in accordance with the ***GDM***, Appendix B, assuming the following soil conditions:

  Medium Dense Granular Soil (Type 2) Standard Penetration Test (SPT) N Values between 10 and 40

  - Effective Soil Unit Weight = 50 pcf
  - Internal Friction Angle = 30°
  - Cohesion = 0 psf
  - Generally use the average N value over the foundation depth

  Loose Granular Soil (Type 1) SPT N values between 4 and 9

- Effective Soil Unit Weight = 40 pcf
- Internal Friction Angle = 28°
- Cohesion = 0 psf

- If the site specific soil conditions are weaker than these values or if a site specific design is desired, design foundations in accordance with ***SDG*** 3.16 and consult with the District Geotechnical Engineer.

Alternate Technical Proposals:

Alternate precast concrete noise wall designs may be considered for approval by the State Structures Design Engineer with concurrence from the District Structures Design Engineer. Design calculations meeting the wind load requirements for the project site in accordance with the ***SDG*** must be submitted for review and approval by the EOR.

Technical Specifications with material and testing requirements should be submitted by the Contractor for approval prior to acceptance of any alternative technical proposal (Contractor Saving Initiative for Design-Bid-Build projects, or Alternative Technical Concept for Design Build/P3 projects).

Higher strength reinforcing meeting the requirements of ASTM A615 or ASTM A1035 may be considered for resizing the flexural reinforcement while maintaining the same concrete cover, dimensions and similar bar spacings for posts, piles and panels.

General Design Limitations:

Ensure the system is constructible along the entire length of the wall with consideration of overhead clearances (e.g. overhead services, tree canopies, existing overhead structures, etc.) and underground services along the entire length of the wall. During the design process, locate potential conflicts or abrupt base elevation changes and include any special designs in the plans.

- If vertical wall clearance is limited, consider the low clearance post/foundation option and shorter panel heights (minimum of 4'). Minimum vertical clearance for use of top-installed panels is controlled by the height of the post plus the tallest panel height and the panel lifting mechanism. Side-installed panel details are included in the Standard; however, use is limited to locations where the vertical clearance between posts prohibits top-installation. Side-installed panels may need to be adjusted during construction; especially the flush face panels which can be very difficult to maneuver into place. Reduced post spacing may exacerbate these tolerance issues.
- If underground services/restrictions exist, making the use of an auger cast pile impractical, consider designing spread footings for the affected locations. If foundations will be installed on a slope or on a berm, adjust the foundation depths based on the ***GDM***, Appendix B.
- The designer must consider both the aesthetic and noise canceling qualities of the wall design. If the base elevations or wall height requirements change along the length of the project, step bottom and/or top of wall panels and post elevations to maintain the aesthetic and noise canceling qualities. If the wall is interrupted or

access is required, include wall offset distances and lap lengths in the wall control drawings.

- Posts for 90° corners are asymmetrical and require adjustments to the post spacing or the adjoining panel lengths.

Plan Content Requirements

Include the "Report of Core Borings" (Soil Information Data) on a separate sheet in the plans.

All non-standard noise wall components such as spread footings, special foundations, posts, panels, etc. shall be fully detailed in the plans.

Drainage Holes: Locate wall drainage holes based on site requirements. Evaluate the capacity of drainage openings and locate horizontally and vertically to ensure that offsite stormwater inflows are accommodated without increasing offsite stormwater stages for the appropriate regulatory design events. Refer to the ***Drainage Manual*** for additional guidance. Show drainage holes in the Control Drawings (including Type).

Anti-Graffiti Coating: Consider coating all publicly accessible portions of the wall panels and posts with an anti-graffiti coating (front and/or back of wall). See **SDM** 4.4 for limits of anti-graffiti coatings. Tabulate limits of anti-graffiti shown on the "LIMITS OF ANTI-GRAFFITI COATING" Data Table. Specify sacrificial or non-sacrificial coating system based on District Maintenance recommendations (See Pay Items).

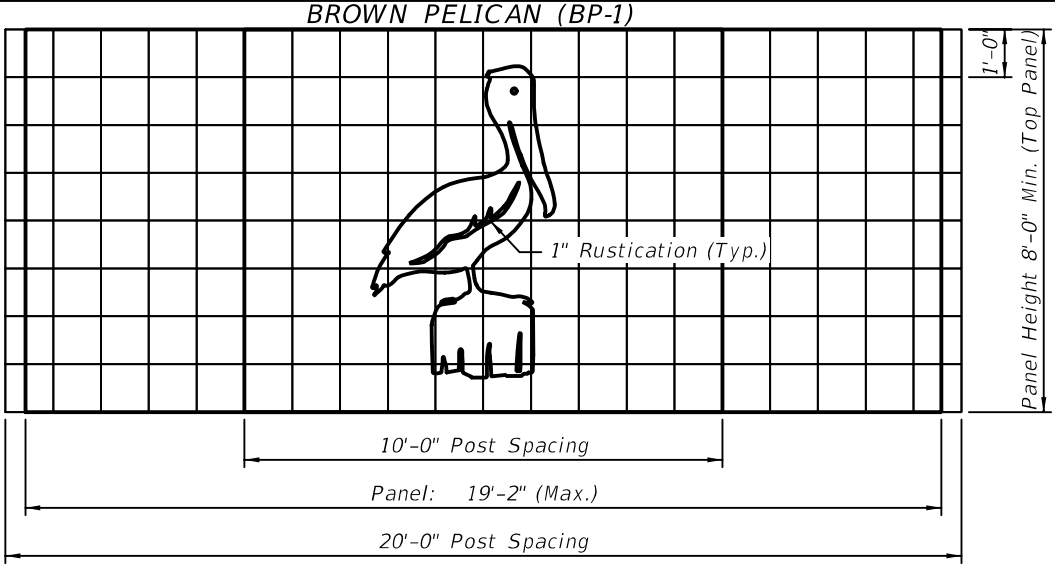
Wall Textures: Specify textures for the front and/or back face of wall. All textures except Type "H" may be used for either the back face or front face of the wall. The Type "H" texture is limited to the front face only. Textures on the front face shall be formed. If wall panels are cast horizontally, textures on the back face must be rolled or pressed, therefore random pattern types on the back face may be more suitable. If wall panels are cast vertically, textures on the back face will be formed, rolled or pressed. For flush face panel options, the textures on the back face may be limited to either "Broom" finish or Type "A" (smooth) finish due to the forming techniques of some manufactures. Type "A" (smooth) finish will provide a surface requiring less maintenance cleaning than that with a "Broom" finish.

Graphics: When required for aesthetics, form wall graphics into the wall panels. Show all graphic locations in the Control Drawings.

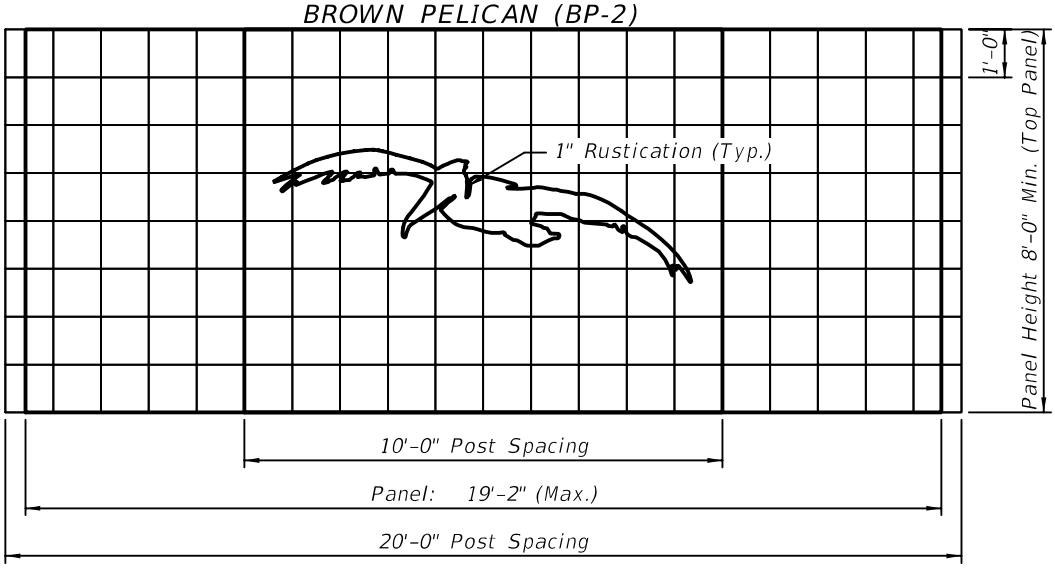
If project specific graphics are required, prepare graphic details using the Blank Grid Noise Wall Graphics CADD cell and include them in the plans.

The following possible standard graphic options are available in the FDOT Structures Bar Menu (and/or CADD cell updates) as Noise Wall Graphics CADD cells:

BROWN PELICAN (BP-1)



BROWN PELICAN (BP-2)



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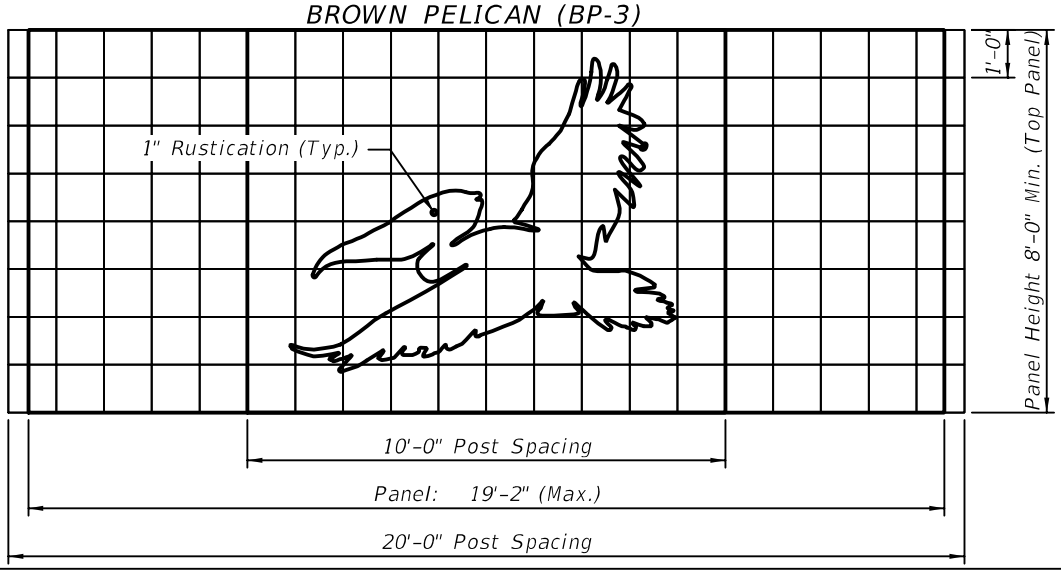
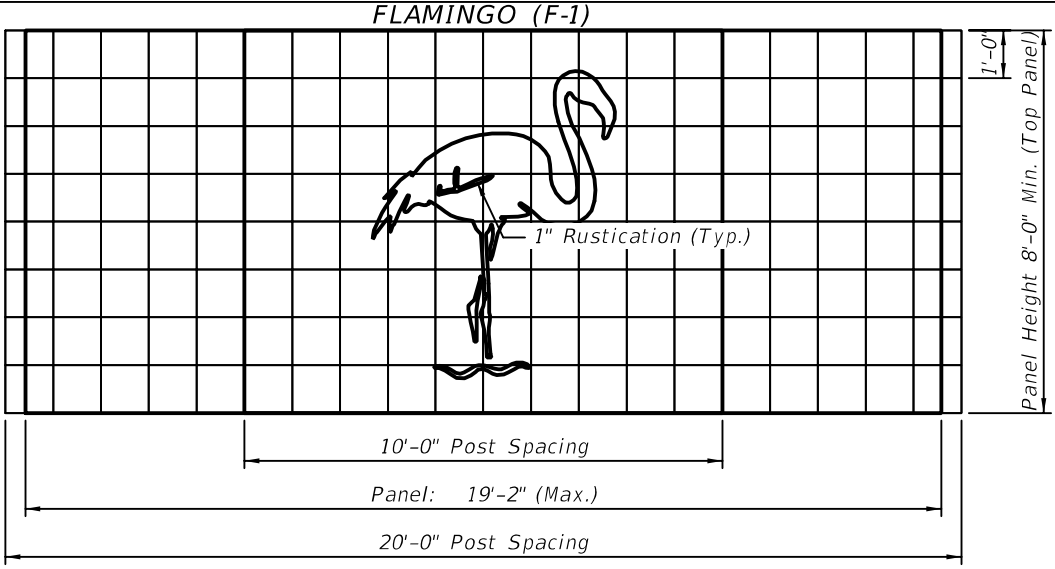


FLAMINGO (F-1)



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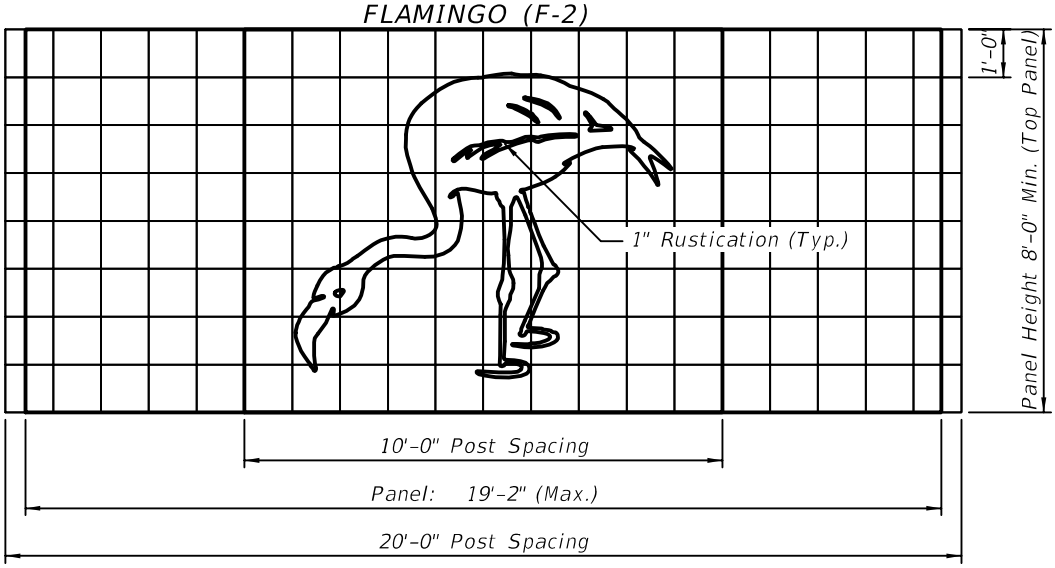
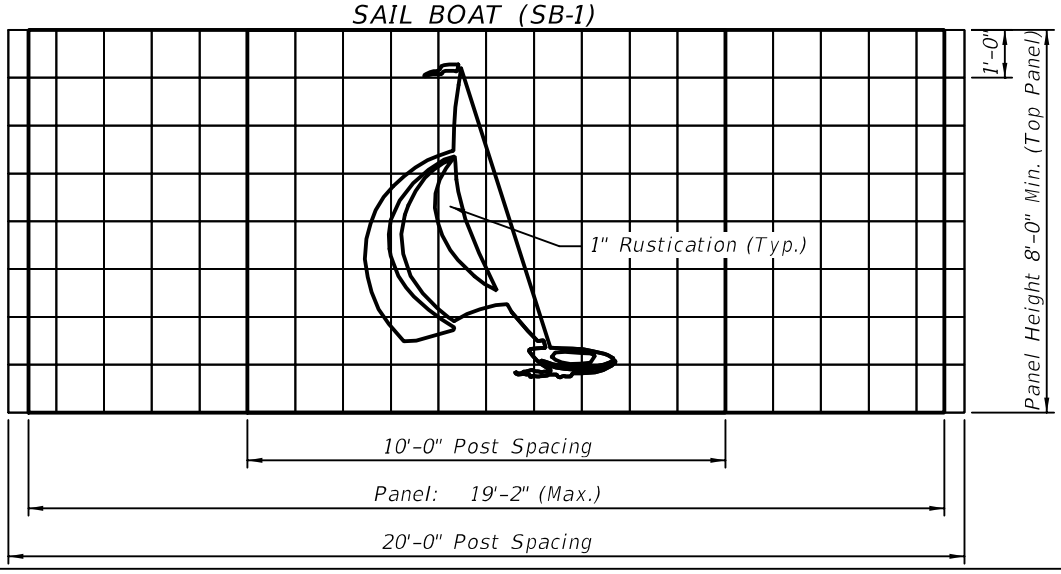
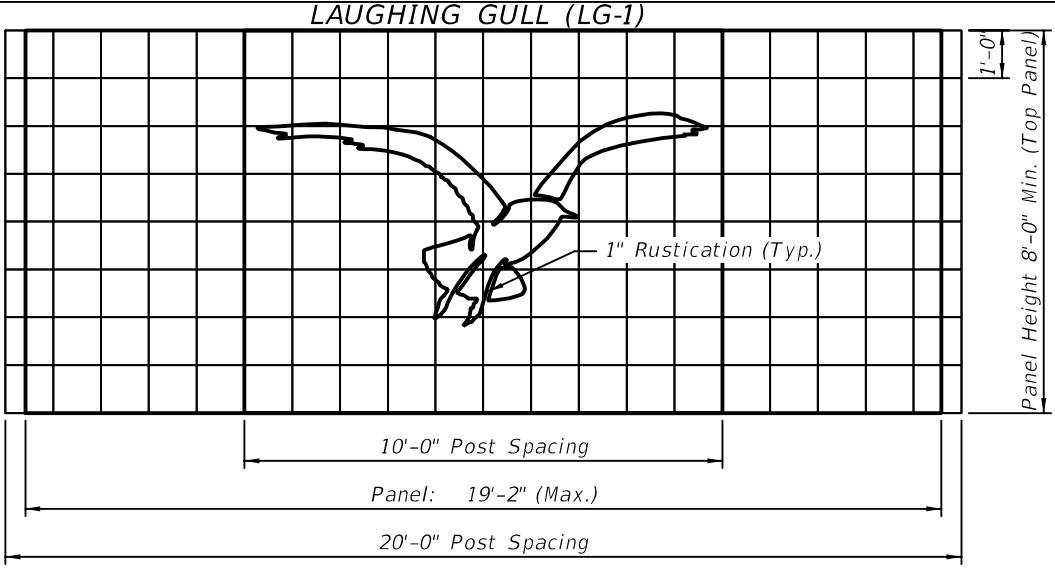


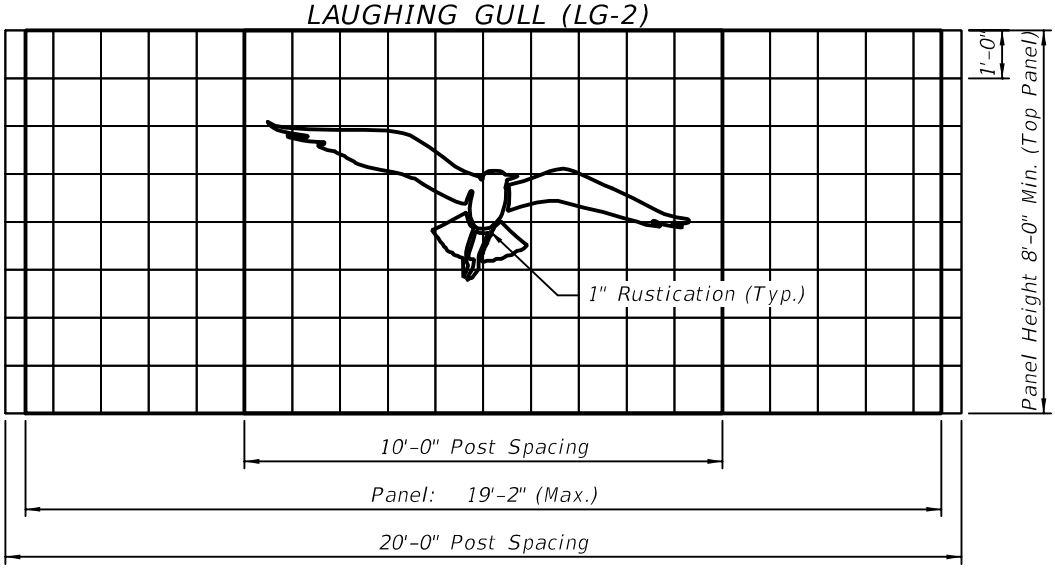
SAIL BOAT (SB-1)



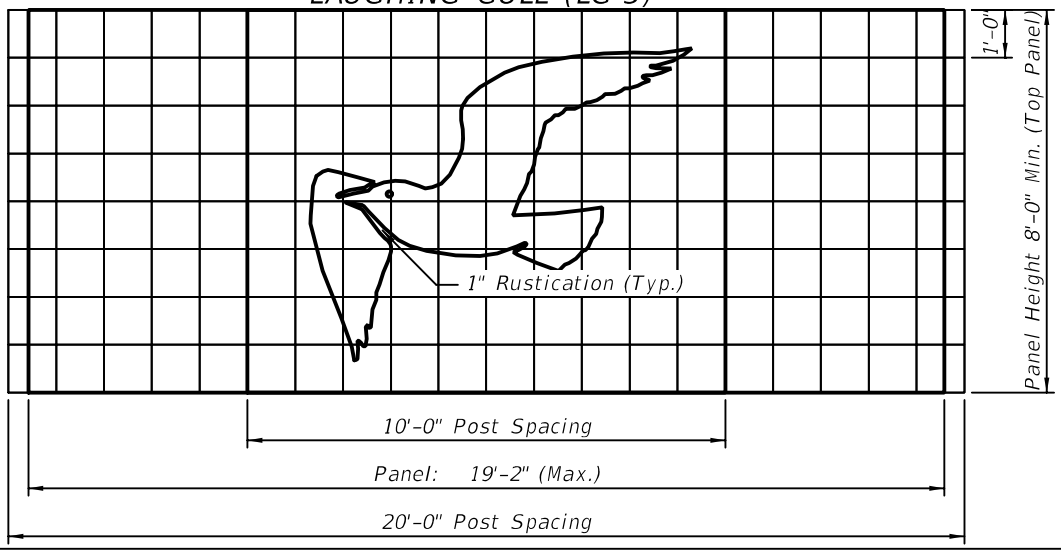
LAUGHING GULL (LG-1)



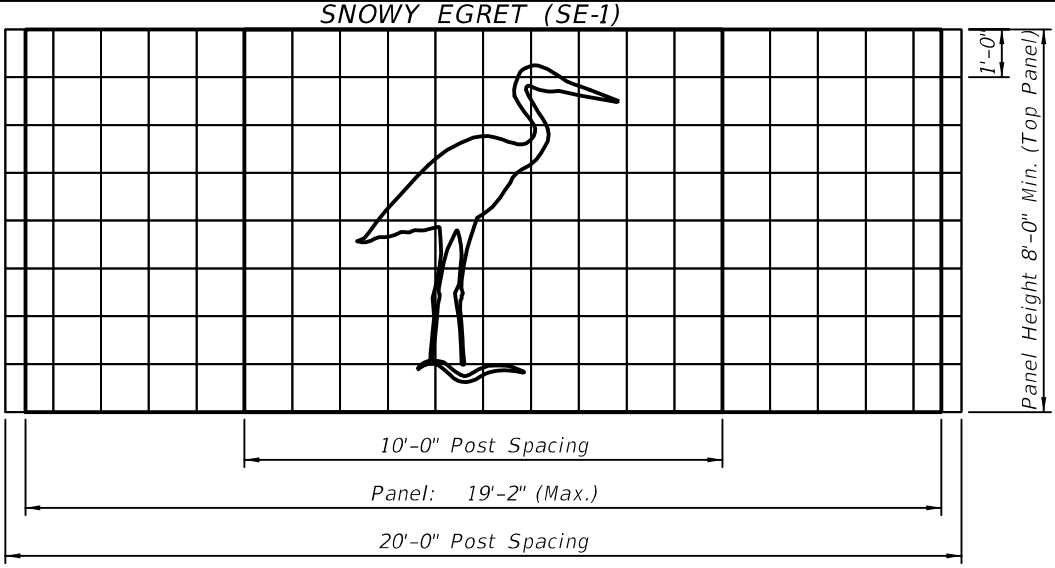
LAUGHING GULL (LG-2)



LAUGHING GULL (LG-3)



SNOWY EGRET (SE-1)



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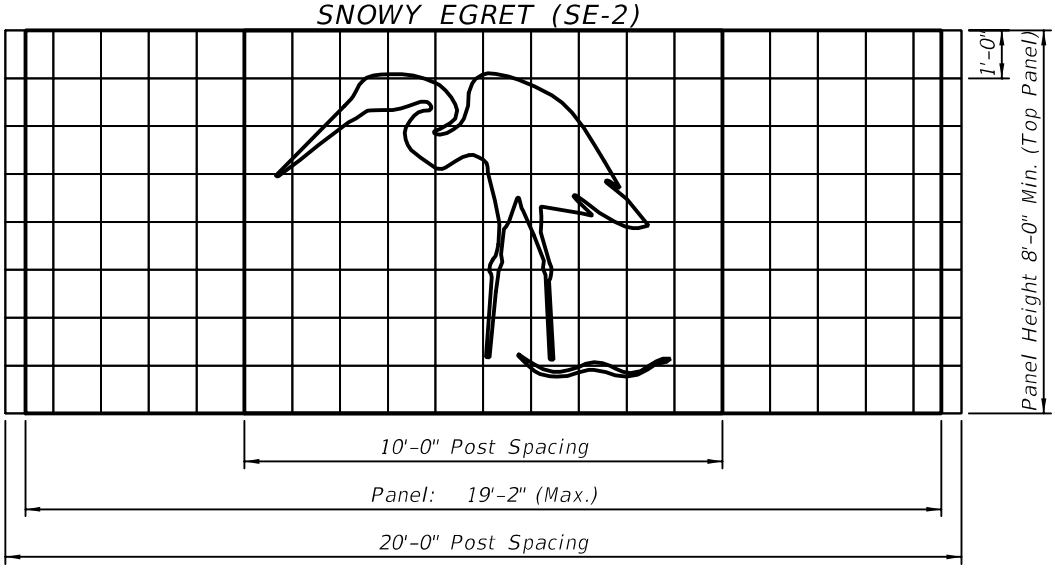
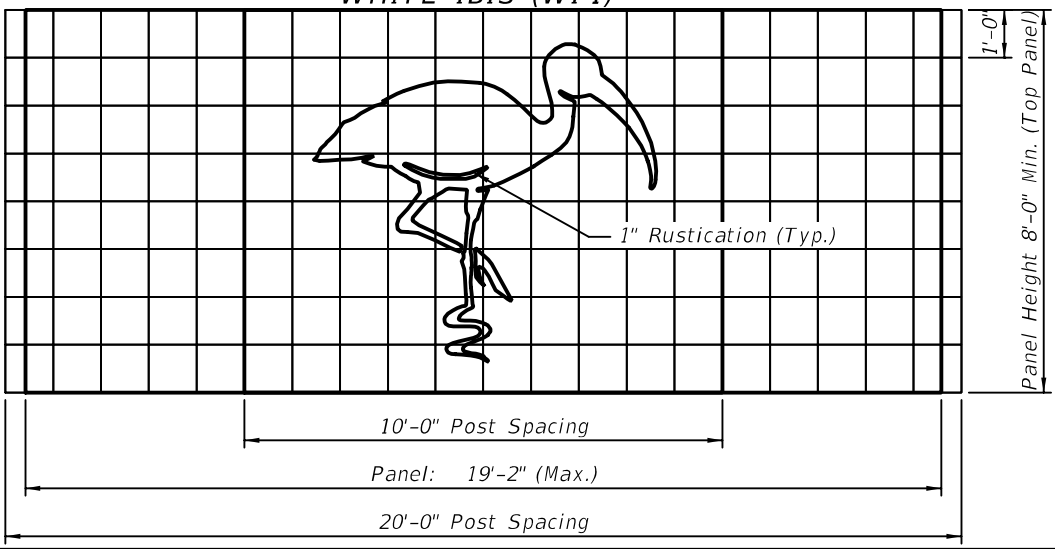
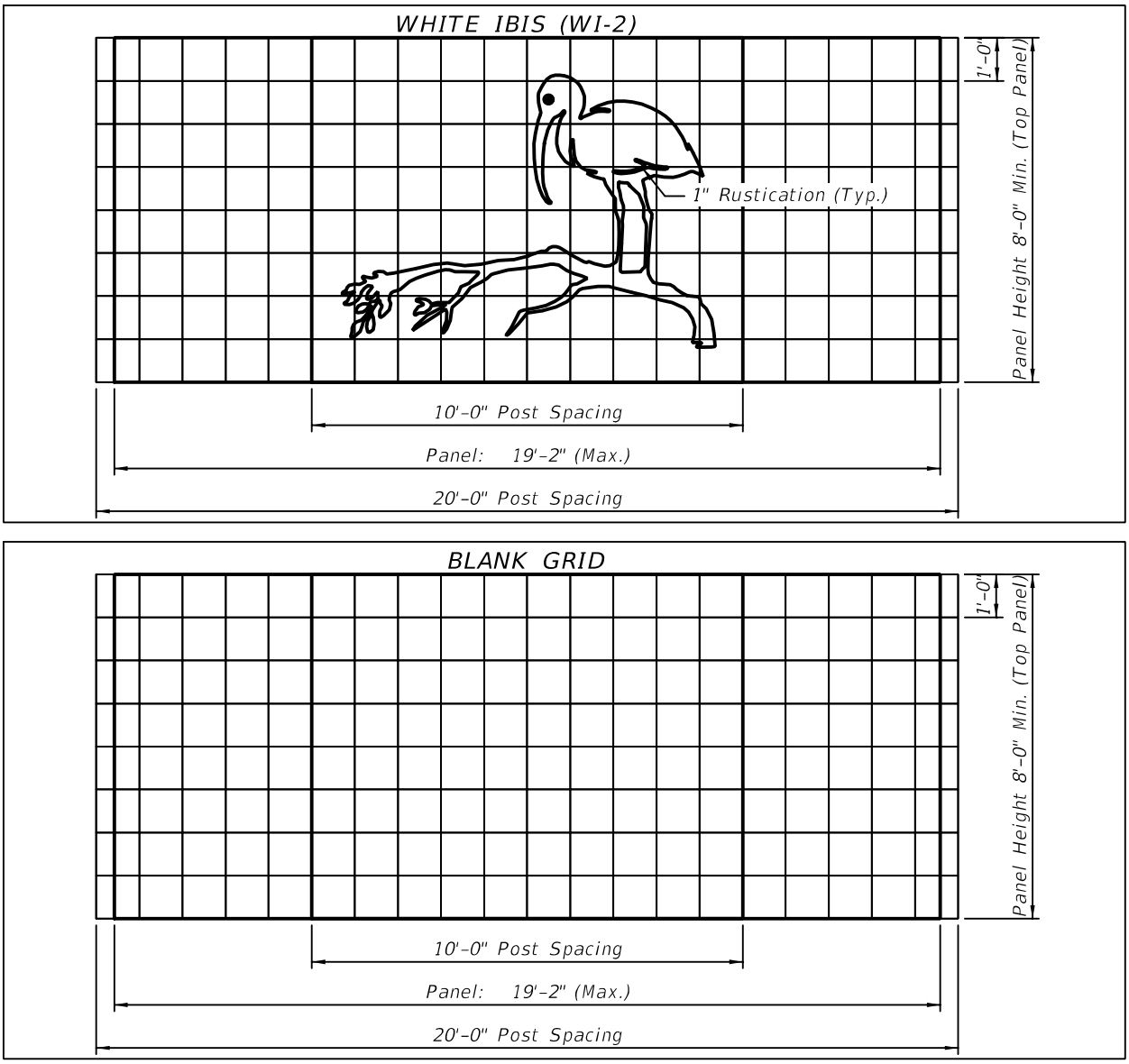


WHITE IBIS (WI-1)





Using the Blank Grid shown above, the Designer may create other graphics as project requirements dictate. Designate each individual project specific graphic with a unique name for identification and cross-reference purposes. General considerations in creating graphics are as follows:

Wall graphics shall be simple and fully detailed in the plans.

Wall graphics should be as large as possible (approximately 8 ft. in height).

Local community input should be considered when determining graphic types.

Post Caps: Indicate in the "PROJECT AESTHETIC REQUIREMENTS" Data Table if Post Caps are required. Only consider Post Caps when enhanced aesthetics are necessary.

Guardrails and delineators may be required at the back face of wall along local streets.

Prepare Control Drawings containing the following information and include them in the plans.

Plan View

- Noise Wall Alignment / Location
- Begin/End Noise Wall Stationings and Offsets
- Offset definition, usually from baseline to front face of Noise Wall
- Step Locations
- Drainage Hole Type and Stations
- Adjacent overhead or in-ground services
- Limits of sod or seeding/topsoil application
- Where removal of or improvements to organic soils are necessary, show the limits of organic soils and the limits of required improvements in the plans along with removal/improvement methods and method of payment.

Elevation

- Begin/End Wall Stations
- Ground line Elevations
- Top of Noise Wall elevations
- Bottom of Noise Wall elevations and post length
- Drainage Holes (Including type)
- Adjacent overhead or in-ground services
- Locations and names of Noise Wall Graphics
- Limits of anti-graffiti coating (if required)

Complete the following Data Tables and include them in the plans. See ***FDM*** **115** for more information regarding use of Data Tables.

In the FOUNDATION column of the SUMMARY OF FOUNDATIONS AND WALL QUANTITIES enter either "2" for Medium Dense Granular Soils (SPT N values between 10 and 40), "1" for Loose Granular Soils (SPT N values between 4 and 9) or "SD" for Special Design. Use "2" for the majority of foundations (SPT values between 10 and 40). Use "1" only if soil conditions warrant (SPT values between 4 and 9) and "SD" only when required.

NOISE WALLS DATA TABLES

PROJECT REQUIREMENTS								Table Date 1-01-14
WALL NO. (1)	REQUIRED: (YES/NO)			REQUIRED TEXTURES:				PANEL TYPE (FLUSH/ RECESSED/ EITHER)
	GRAPHICS (1)	COLORED COATINGS (2)	PRECAST POST CAP (3)	PANELS:		POSTS:		
				FRONT FACE	BACK FACE	FRONT FACE	BACK FACE	

(1) See Control Drawings.
(2) Coat all exposed faces of wall with Class 5 Applied Finish Coating.
The panel color shall be per Federal Color Chart, Federal Standard No. 595C color _____.
(3) The post and cap color shall be per Federal Color Chart, Federal Standard No. 595C color _____.

SUMMARY OF FOUNDATIONS AND WALL QUANTITIES								Table Date 1-01-15
WALL NO.	STATION TO STATION	FOUNDATION (4)	TOP OR SIDE INSTALLED (T, S)	TOP OF WALL ELEV. (FT)	BOTTOM OF WALL ELEV. (FT)	POST LENGTH (FT)	AREA (SF)	

(4) 1 = Loose Granular Soils (4≤N≤9)
2 = Medium Dense Granular Soil (10≤N≤40)
SD = Special Design details (See Contract Plans)

LIMITS OF ANTI-GRAFFITI COATING (5)					Table Date 1-01-15
WALL NO.	STATION TO STATION	FRONT FACE/ BACK FACE/ BOTH (6)	MINIMUM HEIGHT (7)	AREA (SF)	

(5) Coat limits shown in table with _____ (sacrificial/non-sacrificial) anti-graffiti coating matching the wall color.
(6) Includes Posts and Panels.
(7) Height is measured from finished grade.

GENERAL NOTES [Notes Date 1-01-14]:

1. Work these Data Tables with Index 534-200.

2. Noise Walls shall meet the project aesthetic requirements as depicted in the above table and elsewhere in the plans.

3. Front Face indicates roadway side of wall. Back Face indicates non-roadway side of wall.

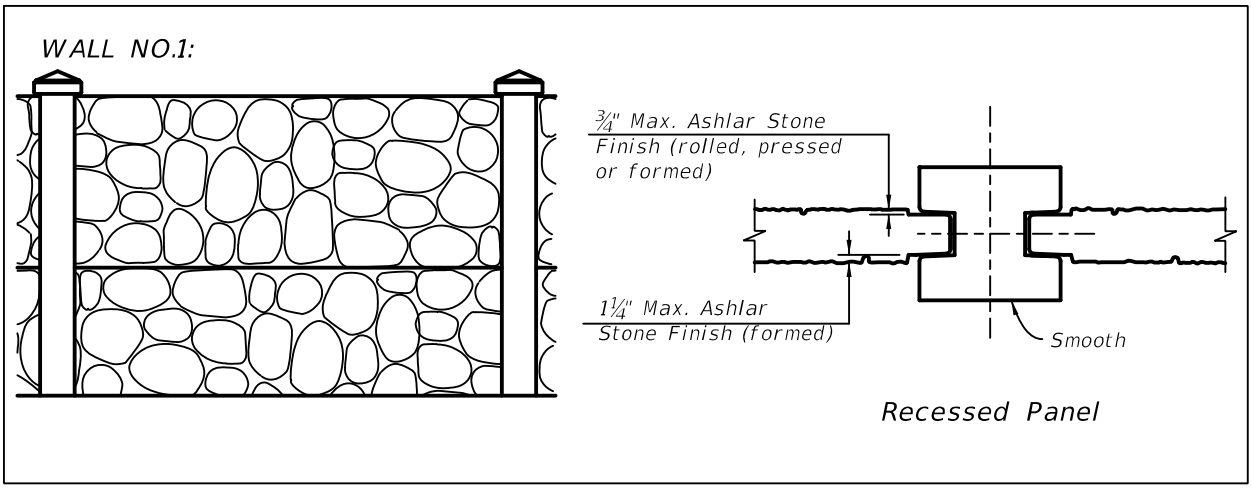
4. Wind Speed is ___ MPH.

Payment

Item number	Item Description	Unit Measure
534-72-101	Concrete Noise Wall, Permanent	SF
534-72-102	Concrete Noise Wall, Temporary	SF

Example

Wall No. 1 aesthetics require a recessed panel type wall with Type C post caps. The front and back face panel textures are to be Ashlar Stone. The post texture is to be smooth. The wall will not have any graphics. The color of the wall, posts and caps is to be a light brown, (color number 33446).



Wall No. 2 aesthetics require a flush panel type wall. The front face of panels and posts are to be Trapezoid Vertical Fins with Fractured Face (Colorado Drag), with graphics. The Back Face Panel texture is to be Pea Gravel. The color of the wall is to be light brown, color number 33446. Post caps are not required.

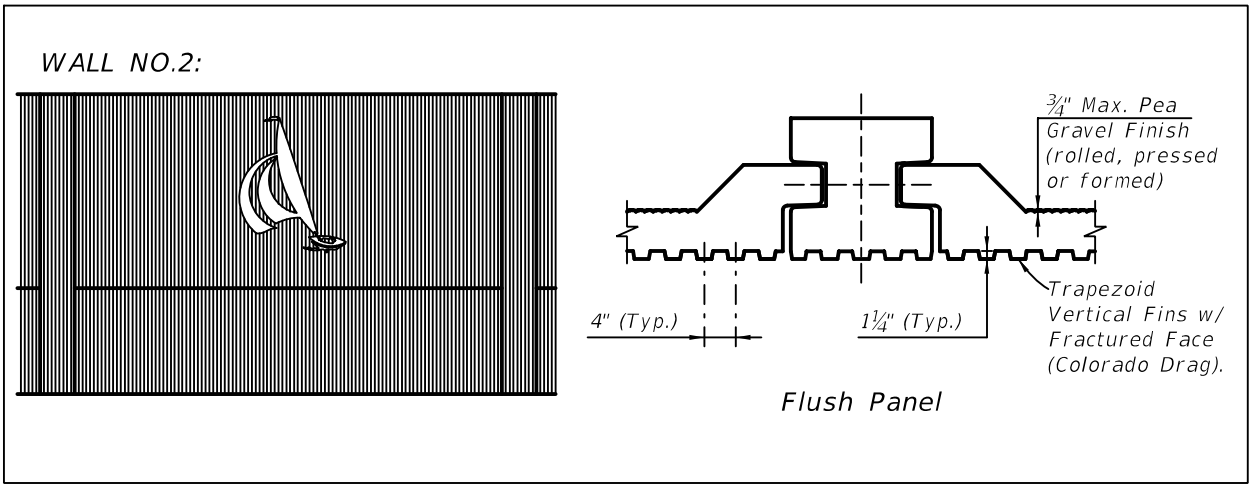


TABLE OF VARIABLES, CADD CELL 534-200 "NOISE WALLS DATA TABLES"

PROJECT REQUIREMENTS								Table Date 1-01-14
WALL NO. (1)	REQUIRED: (YES/NO)			REQUIRED TEXTURES:				PANEL TYPE (FLUSH/ RECESSED/ EITHER)
	GRAPHICS (1)	COLORED COATINGS (2)	PRECAST POST CAP (3)	PANELS:		POSTS:		
				FRONT FACE	BACK FACE	FRONT FACE	BACK FACE	
1	NO	YES	C	B	B	A	A	RECESSED
2	SB-1	YES	NO	H	F	H	A	FLUSH

(1) See Control Drawings.
(2) Coat all exposed faces of panels with Class 5 Applied Finish Coating. The color shall be per Federal Color Chart, Federal Standard No. 595C color 33446.
(3) Coat post caps the same color as posts, with a Class 5 Applied Finish Coating. The color shall be per Federal Color Chart, Federal Standard No. 595C color 33446.