Florida Department of Transportation

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ANANTH PRASAD
SECRETARY

STRUCTURES DESIGN BULLETIN 13-05

(FHWA Approved: May 30, 2013)

DATE: May 31, 2013

TO: District Directors of Operations, District Directors of Production, District Design Engineers, District Construction Engineers, District Geotechnical Engineers, District Structures Design Engineers, District Drainage Engineers

FROM: Robert V. Robertson, P. E., State Structures Design Engineer

COPIES: Tom Byron, Brian Blanchard, Duane Brautigam, David Sadler, Michael Shepard, Larry Jones, Charles Boyd, Rodrigo Herrera, Jeffrey Ger (FHWA)

SUBJECT: Criteria for the Use of Drainage and Utility Conveyances near Earth Retaining Structures

REQUIREMENTS

Replace ***Structures Design Guidelines***, Section 3.13.1 with the following:

A. See Chapter 30, ***PPM*** Volume 1 and ***SDM*** Chapter 19 for retaining wall plans preparation and administrative requirements in conjunction with the design requirements of this Section. Refer to ***SDG*** Chapter 1 for the retaining wall concrete class (excluding MSE Walls) and reinforcing steel cover requirements.

B. Rankine earth pressure may be used in lieu of Coulomb earth pressure.

C. During the design process, review wall locations for conflicts with existing or proposed structure foundations, drain pipes and drainage structures located beneath or adjacent to the proposed wall and/or reinforced soil zone. Analyze for constructability, settlement effects, wall stability, maintenance repair access, potential for removal or relocation of the structure foundation, drain pipe or drainage structure, etc. as appropriate.

D. Design all drainage conveyances and structures within or adjacent to retaining walls to accommodate twice the controlling settlement. In addition, separately encase or wrap with filter fabric all drainage structures and conveyances using the criteria shown in Table 3.13.1-1 and Figures 3.13.1-1 through 3.13.1-6. For the purposes of this table and these figures, the longitudinal direction is defined as being along the bridge or wall stationing line and the transverse direction is defined as being perpendicular to the longitudinal direction. For skewed walls and in the cases where the criteria for longitudinal and transverse directions overlap, e.g. at wall corners, the more stringent criteria shall apply.

E. Coordinate the design of drainage conveyances and structures within and adjacent to retaining walls with the Drainage EOR.

F. During the design process, review wall locations for conflicts with existing or proposed utilities located beneath or adjacent to the proposed wall and/or reinforced soil volume. Coordinate wall and utility locations and designs with the District Utilities Engineer. The use of requirements established for drainage conveyances and structures as listed in this section is preferred. See the ***Utilities Accommodation Manual*** for more information.

Table 3.13.1-1 Soil Zone Criteria

Soil Zone	Requirements [1]
A	Longitudinal and transverse conveyances must be separately encased or wrapped with filter fabric.
B	Longitudinal and transverse conveyances must be separately encased.
C	No longitudinal conveyances allowed. Transverse conveyances must be separately encased.
D	If c < d, longitudinal and transverse conveyances must be separately encased.
E	No longitudinal conveyances allowed. Transverse conveyances must be separately encased or wrapped with filter fabric.
F	Longitudinal conveyances must be separately encased. Transverse conveyances must be separately encased or wrapped with filter fabric.
G	No longitudinal or transverse conveyances allowed.
H	For conveyances to be placed within or below the reinforced soil mass, consider future maintenance and access requirements through reinforcement that will remain in place.
I	Longitudinal conveyances outside traffic lanes must be separately encased. No longitudinal or transverse conveyances below traffic lanes.

1. Requirements apply to walls designed and constructed using a Design Standard as shown, similar non-standardized wall designs and to other wall types as listed.

Commentary: It is undesirable and in some cases impossible to incorporate drain pipes and utilities within the layered structural elements in the reinforced soil zone of an MSE Wall, considering special design and construction difficulties result from introducing obstructions. Drain pipes and utilities placed below the wall or in the reinforced soil zone cannot be maintained because excavation in this zone can potentially undermine stability of the wall. In addition, leaking pipes can generate soil wash out and compromise the structural integrity of the wall. Special design constraints may be imposed when a pressurized utility carrier is placed within, through, under, or immediately adjacent to an MSE Wall. This is to assure the design of structural elements takes into consideration support limitations that may be created by the presence of utilities and potential damage or failure if a pressurized utility carrier leaks.

Figure 3.13.1-1 Cast in Place Wall Soil Zone Details

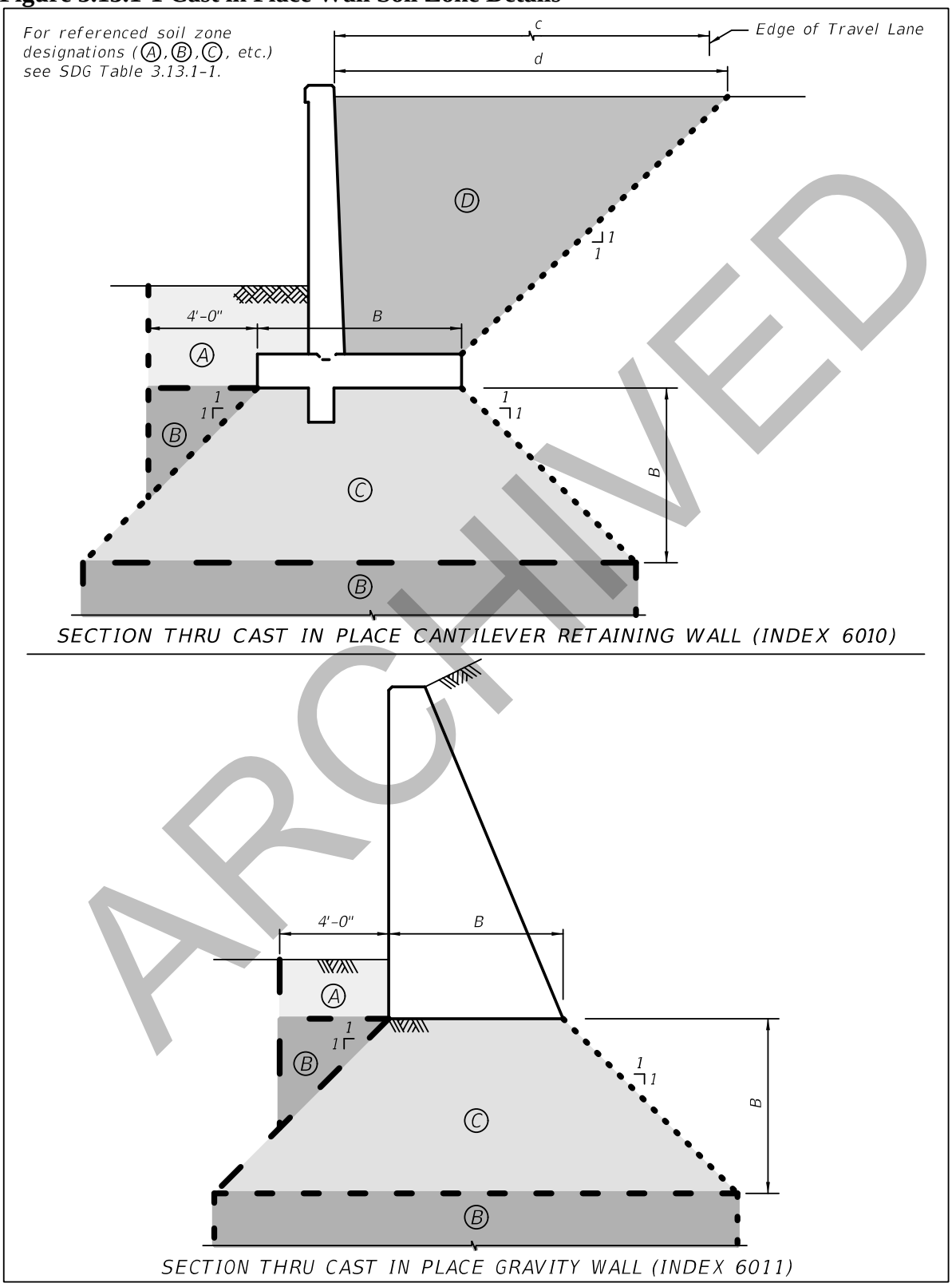


Figure 3.13.1-2 Permanent MSE Wall Soil Zone Details (1 of 2)

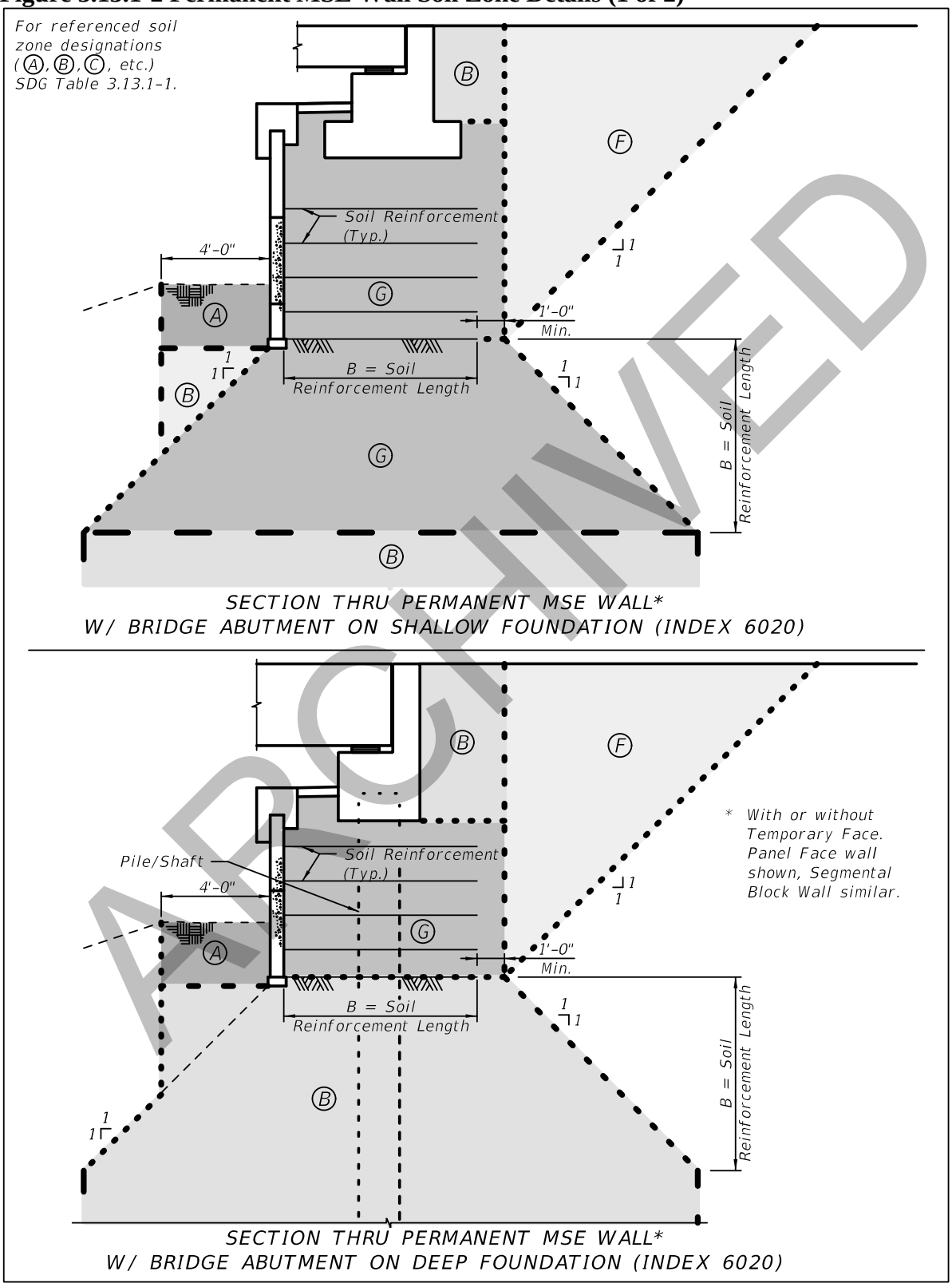


Figure 3.13.1-3 Permanent MSE Wall Soil Zone Details (2 of 2)

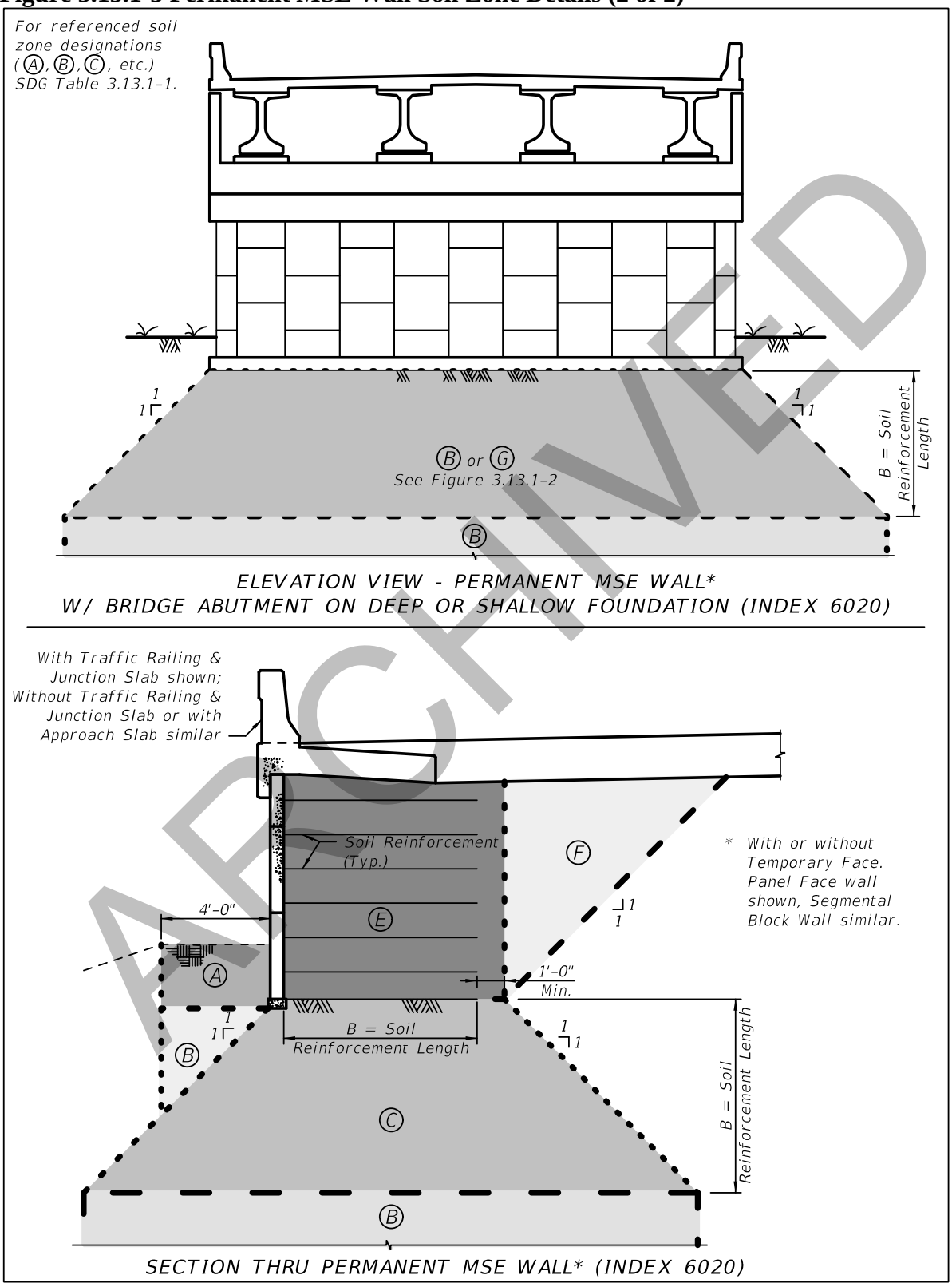


Figure 3.13.1-4 GRS Abutment Wall Soil Zone Details

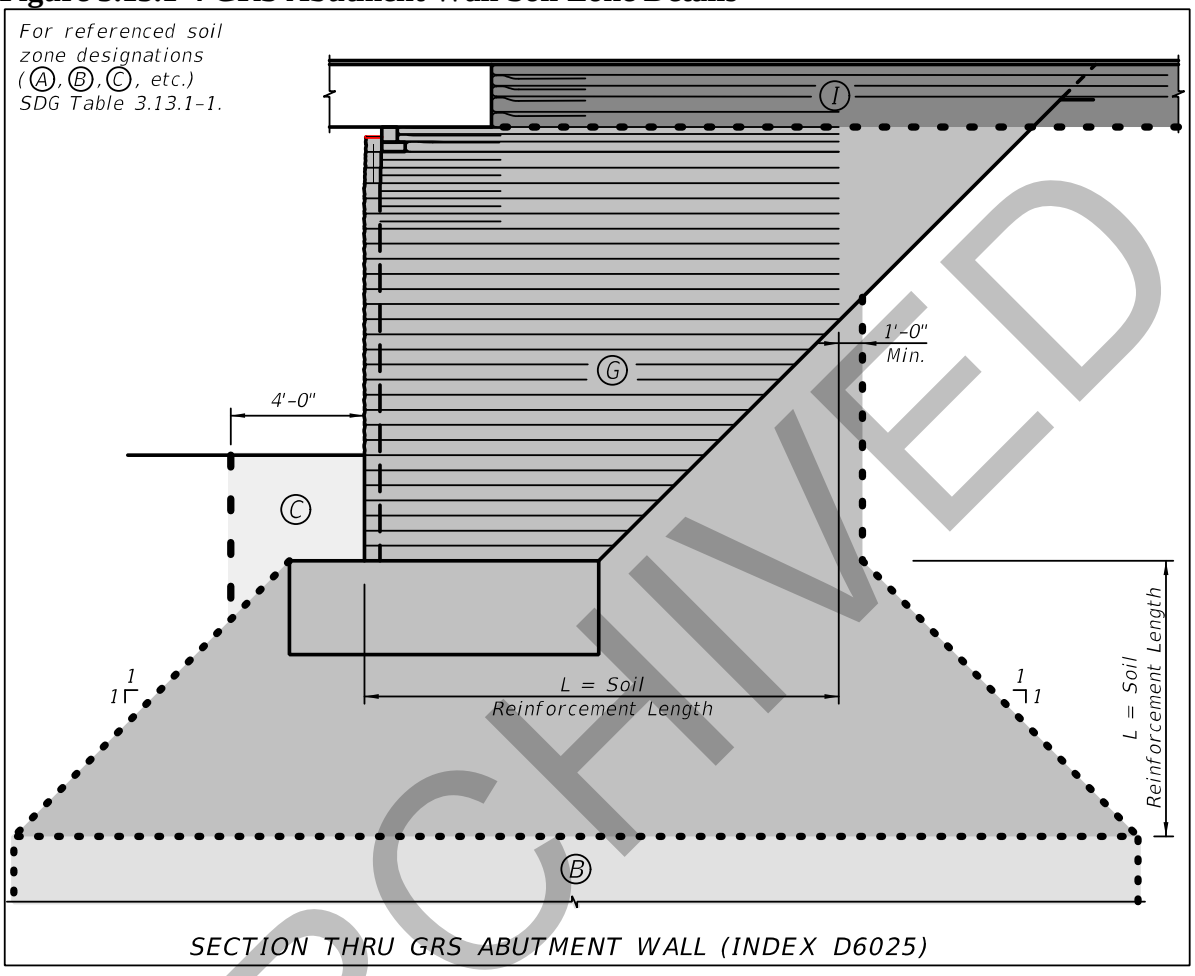


Figure 3.13.1-5 Temporary MSE Wall Soil Zone Details

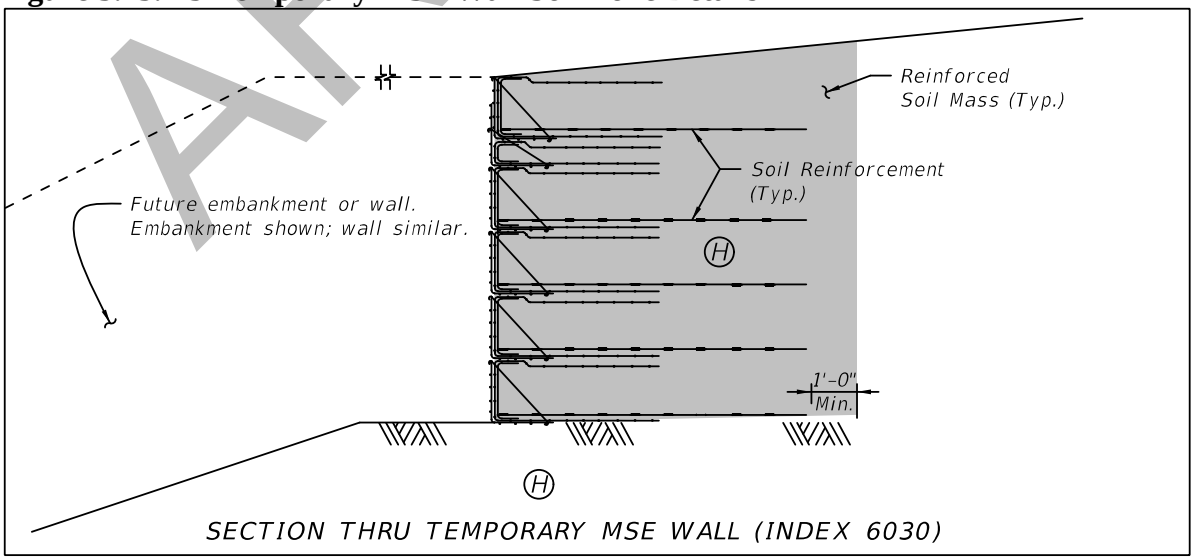
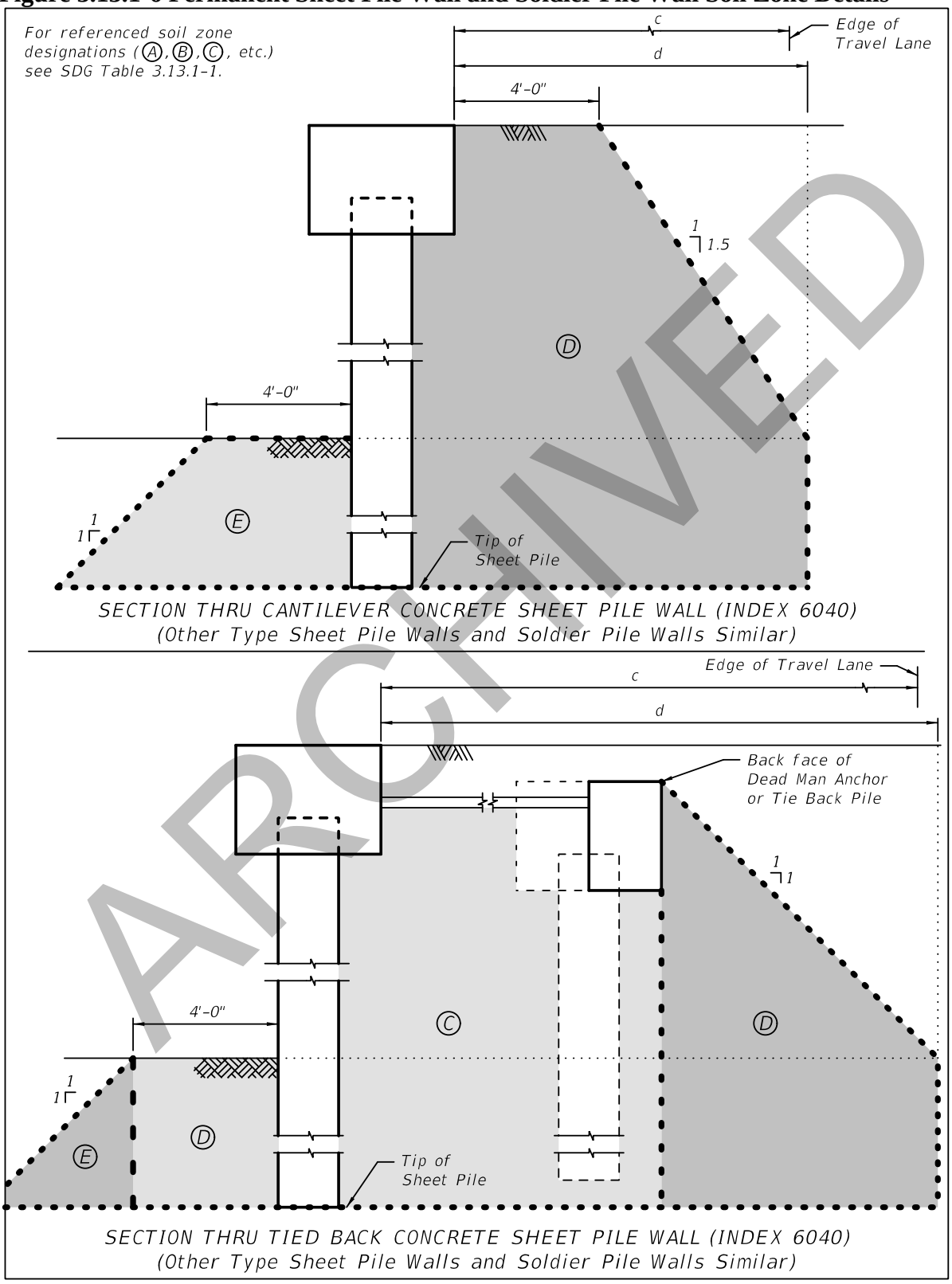


Figure 3.13.1-6 Permanent Sheet Pile Wall and Soldier Pile Wall Soil Zone Details



COMMENTARY

Retaining wall performance is highly sensitive to changes in volume of the foundation soil and in the soil within proximity of the wall perimeter. To prevent issues related to water influx and soil migration that could result in undesirable aesthetics, wall instability and/or structural distress of the wall, supported structures and/or roadways, conveyances for drainage have been conditioned or eliminated as described. Until such time as they are addressed through formal processes, it is recommended that conveyances for utilities follow the same requirements as those listed for drain pipes and drainage structures.

BACKGROUND

Loss of soil through drainage conveyances located directly below or in proximity to earth retaining walls have occurred in the past, prompting remedial actions to ensure stability of the wall and serviceability of the associated structures and roadways. The requirements stated herein are intended to protect walls and the traffic or other structures that would be directly affected by their subsidence, shifting or other forms of compromise.

IMPLEMENTATION

These requirements are effective immediately on all design-bid-build projects in Phase I design development (less than 30% complete). These requirements may be implemented immediately on all design-bid-build projects in Phase 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 that have had the final RFP released are exempt from these requirements unless otherwise directed by the District.

CONTACT

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