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Subject: Design and Evaluation of I-Walls Including Sheet Pile Walls

Applicability: Guidance

References:

- a. EC 1110-2-6066 “Engineering and Design: Design of I-Walls”
<https://ten.usace.army.mil/TechExNet.aspx?p=s&a=EC;47>
- b. ETL 1110-2-575 “Engineering and Design: Evaluation of I-Walls”
http://www.publications.usace.army.mil/Portals/76/Publications/EngineerTechnicalLetters/ETL_1110-2-575.pdf
- c. EM 1110-2-2504 “Engineering and Design: Design of Sheet Pile Walls”
http://www.publications.usace.army.mil/Portals/76/Publications/EngineerManuals/EM_1110-2-2504.pdf
- d. Ebeling, R. M., Fong, M. T., and White, B. C. 2014. Analysis of a Flood Plain I-Wall Embedded in Horizontally Stratified Soil Layers During Flood Events Using Corps I-Wall Version 1.0, U.S. Army Engineer Research and Development Center, ERDC Technical Report ITL-14, Vicksburg, MS.

1. Purpose. This bulletin transmits specific guidance to be used for the design and evaluation of I-Walls and Sheet Pile Walls with links to the supporting documentation located on the USACE Official Publications site and/or the Technical Excellence Network (TEN) site.
2. Distribution. Unlimited
3. Background. EC 1110-2-6066 “Engineering and Design: Design of I-Walls” has expired and a replacement document has not been completed. This document provides interim guidance while the new document is being developed.
4. Design Guidance. For the design of I-walls, use EC 1110-2-6066. For the evaluation of I-walls, use ETL 1110-2-575. For the design of cantilever and single anchored earth retaining sheet pile walls, use EM 1110-2-2504. Links to the documents are provided above.
5. I-Wall Design Height Limits. Paragraph 6-8.d of EC 1110-2-6066 states that until the Phase III investigations and guidance provides more information about gap formation and loading and

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deformations, the maximum unsupported stem height shall be limited to six feet for I-Walls located on levees or in soft soils. Phase III studies were completed in support of ETL 1110-2-575. Basic height limits for design can be determined using ETL 1110-2-575, Table B-2. For load cases and foundation conditions not listed on the table, designers must use soil structure interaction (SSI) analysis methods to estimate deflections. I-walls subject to usual and unusual loads must behave resiliently, i.e., no significant permanent deflection. Limit Equilibrium Methods, like those used in CWALSHT and Corps I-wall, cannot provide accurate calculation of deflections.

6. Computer Programs. Corps I-Wall Version 1.0 (Ebeling, et.al, 2014) is available for the design of I-walls on flat ground. It has the ability to: account for wave loading in the analysis of coastal I-Walls; apply a hydraulic fracturing criterion to analyze gap initiation and propagation in saturated soils; and to construct System Response Curves for use in probabilistic analyses. Additionally, Corps I-Wall addresses shortcomings in CWALSHT for situations with undrained soils. CWALSHT can be used for anchored sheet pile walls. For I-Walls on levees, where limit equilibrium methods used in CWALSHT can overestimate passive lateral resistance on the dry side of the levee (ETL 1110-2-575, Appendix D), SSI methods must be used to ensure all failure modes are recognized and deflections are controlled. Computer programs can be downloaded at <https://knowledge.usace.army.mil/Hub.aspx>.

7. Point of Contact. The points of contact for this ECB are Richard Ludwitzke, CECW-CE, 202-761-1580; Kent Hokens, CEMVP-EC-D, 651-290-5584; and Neil Schwanz, CEMVP-EC-G, 651-290-5653.

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