Influence of the Construction of Uncased Drilled Shafts at Close Proximity of MSE Wall Facing

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Presentation Outline

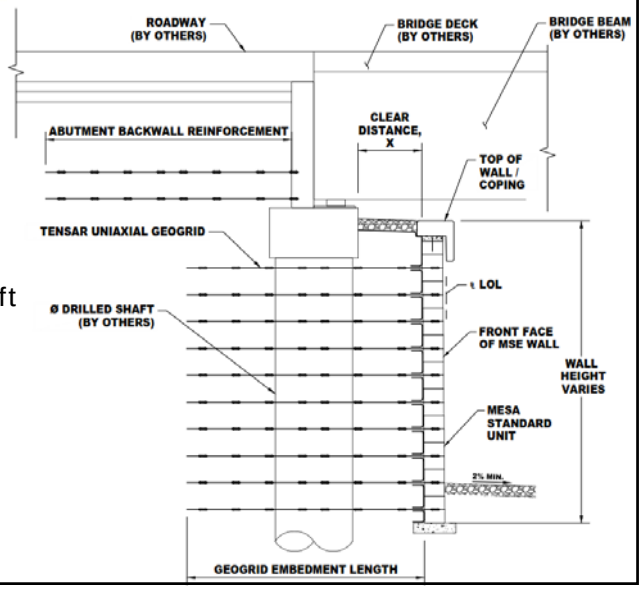
- Review Standard of Practice of Pile / Drilled Shaft Installation at MSE Walls
- Overview and Construction of Test Wall Project – Uncased Drilled Shafts Close to Wall Face
- Detailing around MSE Modular Block Wall
- Observations and Measurements

Deep Foundation Installation Standard of Practice

- Typical construction technique
  - Preinstall the pilling or sleeves to drive piles through and then construct the wall by placing reinforcement and fill around the piles / sleeves

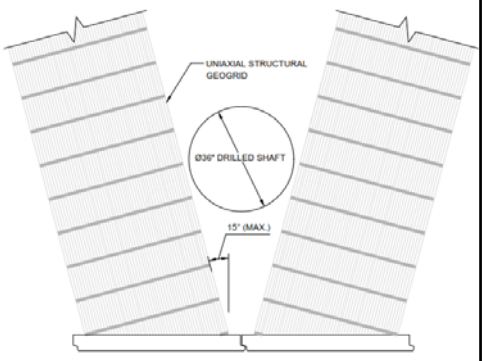
Deep Foundation Installation Standard of Practice

- FHWA Guidelines
  - Driven piles X = 1.5ft
  - Drilled shaft X = 3ft



Deep Foundation Installation Standard of Practice

- Cut around geogrid reinforcement
- Skew geogrid reinforcement around piles / shaft



Uncased Drilled Shafts close to MSE Wall Face After Wall Construction

- **Advantages**

- Speed of wall construction – fill and reinforcement around piles / sleeves
- Proper compaction around the piles / sleeve
- Eliminate controls and construction techniques to hold sleeves in a vertical position during fill placement and compaction

Uncased Drilled Shafts close to MSE Wall Face After Wall Construction

- **Questions / Concerns**
  - Can bore holes for drilled shafts be effectively drilled through the geogrid reinforced wall
  - Does drilling operations cause excessive rotation or lateral movement of the wall face
  - How are layers of geogrid reinforcement affected by the drilling operations
- Investigate / verify through test wall – Drilling 18" from the back of wall face and 8ft deep

Overview and Test Wall Construction

- Leveling Pad Construction

Overview and Test Wall Construction

- Install blocks and backfill

Overview and Test Wall Construction

- Detailing at block face

Overview and Test Wall Construction

- Geogrid Placement & Backfill

Overview and Test Wall Construction

Overview and Test Wall Construction

- Drilling Operation

Detailing at Modular Block Face

Bore Hole Location	Face Block Treatment	Geogrid Details
1	Core fill, #3 horizontal rebar in all block courses. Masonry glue on top 5 block courses	Geogrid Precut around drilled shaft
2	Grout, #3 horizontal and vertical rebar on all block courses	Geogrid Precut around drilled shaft
3	Core fill and #3 horizontal rebar in all block courses except grout and #3 horizontal rebar on top 5 courses.	Geogrid Precut around drilled shaft
4	Core fill and #3 horizontal rebar in all block courses except grout and #3 horizontal rebar on top 5 courses.	Geogrid Precut around drilled shaft
5	Core fill, #3 horizontal rebar in all block courses. Masonry glue on top 5 block courses	Geogrid Precut around drilled shaft
6	Core fill and #3 horizontal rebar in all block courses except grout and #3 horizontal rebar on top 5 courses.	No Geogrid Precut
7	Core fill, #3 horizontal rebar and masonry glue on top 5 block courses only	No Geogrid Precut

Detailing at Modular Block Face

Precut Geogrid Around Shaft Location

Full Coverage Geogrid

Detailing at Modular Block Face

Grout with Vertical & Horizontal Rebar

Core Fill and Horizontal Rebar

Observation and Measurements

Observation and Measurements

Offset from MSE Leveling Pad

Bore Hole Location	Block Course above Leveling Pad Pre-Drilling			Block Course above Leveling Pad Post Drilling		
	1	7	12	1	7	12
1	4"	5-4/8"	6-1/8"	4"	5-4/8"	6-1/8"
2	4"	4-6/8"	5-3/8"	--	--	--
3	4"	4-7/8"	5-4/8"	--	--	--
4	4"	5-3/8"	7"	4"	5-3/8"	7"
5	4"	4-1/2"	5-4/8"	4"	4-3/4"	5-3/8"
6	4"	6"	7-4/8"	4"	6"	7-4/8"
7	4"	4-2/8"	7-4/8"	4"	4-2/8"	7-4/8"

Observation and Measurements

- No measurable or very small movement even with the least combination of facing treatment and geogrid detailing (No grout, no geogrid precut)
- Geogrid layers at all bore hole locations cleanly sheared and no evidence of being pulled by auger
- Drilled hole remains open with no sign of collapse in Sandy backfill – Effect of Soil-Geogrid Composite

SUMMARY / CONCLUSION

- Feasible to perform drilled shaft installation without casing at close proximity to the wall facing after geogrid reinforced MSE wall construction
- Drilling operations can be performed as close as 18 inches from the MSE wall facing with minimal remedial block facing treatments at the core
- This method of construction allows proper compaction of the backfill in the tight space between drilled shaft and wall facing, and reduces the impact of downdrag and therefore cost of the deep foundation structure
- It is acceptable to drill through the HDPE geogrid at close proximity to the wall facing without precutting the geogrid
- The compacted composite mass of the planar geogrid reinforced zone allowed the drilled hole to stay open and geogrid to be drilled through without measurable movement to the wall facing

THANK YOU & QUESTIONS

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