



JEM446

ŞEHİR PLANLAMASINDA JEOLojİ

Ders Notları 13.Hafta

Dr. Koray ULAMIŞ

Ankara

ZEMİN İYİLEŐTİRME YÖNTEMLERİ

Zemin iyileŐtirilme yöntemleri dört ana gruba ayrılabilir (Yıldırım, 2002):

- mekanik
- hidrolik
- fiziksel ve kimyasal iyileŐtirme
- ekleme ve sınırlama

Bu yöntemlerin uygulanması (tek başına veya kombine) ile aŐağıdaki hedef veya hedefler gerçekleştirilir:

- saha zemininin kayma dayanımını arttırmak
- zeminin yapısal yükler altında beklenen oturmasını azaltmak
- zeminden su/sıvı sızıntısı kayıpları azaltmak (bent, baraj, gölet, atık depolama sahaları gibi uygulamalarda)

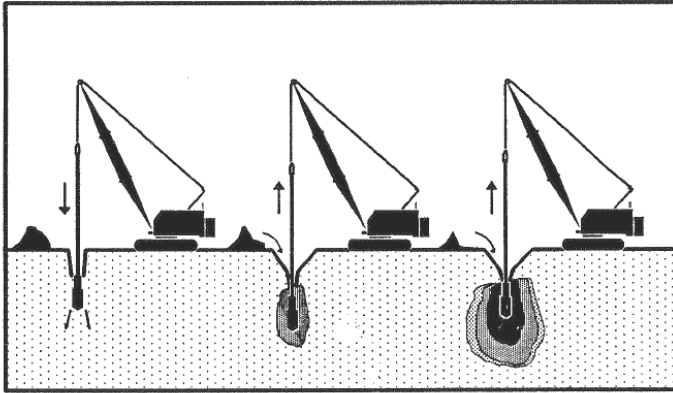
Zemin İyileştirme (İslah) Yöntemlerinin Sınıflandırılması

Mekanik	Hidrolik	Fiziksel ve Kimyasal	Ekleme ve Sınırlama
<ul style="list-style-type: none">• Silindirle (düz, titreşimli, darbeli, yoğurmalı) sıkıştırma• Derinde Titreşim• Patlatma	<ul style="list-style-type: none">• Ön Yükleme• Drenaj• Elektro-ozmos	<ul style="list-style-type: none">• Yüzeysel zemini katkı ile iyileştirme• Derin zemini katkı ile iyileştirme (Enjeksiyon, Jet Grout, vs)• Isıtma-Dondurma <p>Yaygın olarak kullanılan katkılar: Çimento, Kireç, Uçucu kül, Fiber, Bentonit, vs.</p>	<ul style="list-style-type: none">• Donatılı duvarlar (geosentetik, çelik, vs. kullanarak)• Zemin Çivisi• Ankraj• Kazık, taş kolon• Diyafram duvar, palplanş perde• Zemin dayanma yapıları (ağırlık, betonarme, gabion, vs.)

Vibro-Compaction (Vibroflotation)

Vibro-Compaction is...

The rearrangement of particles into a denser configuration by the use of powerful depth vibrators.



Vibro-Compaction Applications

- Reduction of foundation settlements
- Reduction of the risk of liquefaction due to seismic activity
- To permit construction on granular fills

Important Vibro-Compaction Parameters

- Ground type and gradation
- Relative density

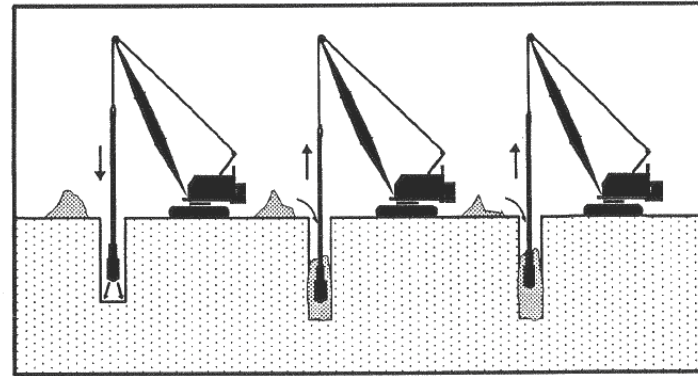
Vibro System Acceptance Testing

- Standard Penetration Test (SPT)
- Cone Penetrometer Test (CPT)
- Dilatometer Test (DMT)
- Load test
- Pressuremeter Test (PMT)

Vibro-Replacement (Stone Columns)

Vibro-Replacement is...

The improvement of more cohesive soils by reinforcement of the soil with compacted granular columns or "stone columns."



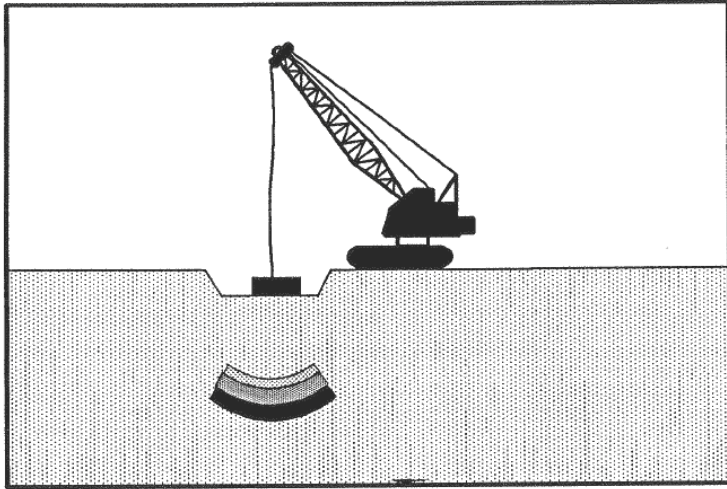
Vibro-Replacement Applications

- Reduction of foundation settlement
- Improve bearing capacity/reduce footing size requirements
- Reduction of the risk of liquefaction due to seismic activity
- Slope stabilization
- To permit construction on fills

Dynamic Deep Compaction

Dynamic Deep Compaction[™] is...

Dropping of heavy weights on ground surface to densify soils at depth.

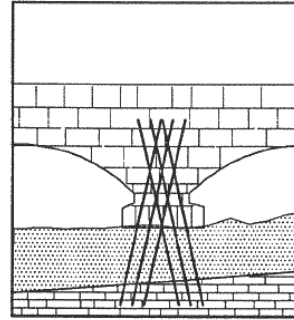


Important DDC Geotechnical Parameters

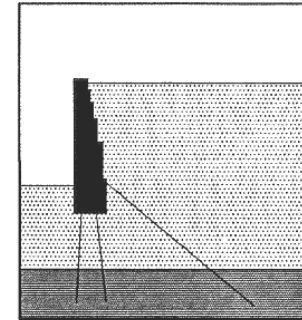
- Ground type
- Relative density
- Degree of saturation
- Permeability

Minipile Applications

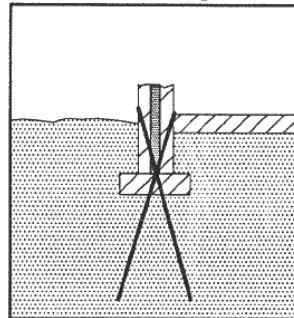
Bridge Piers and Abutments



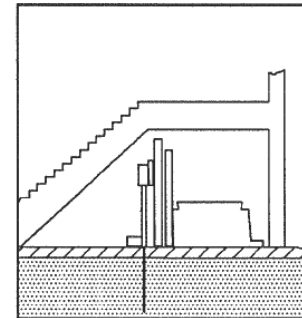
Retaining Walls



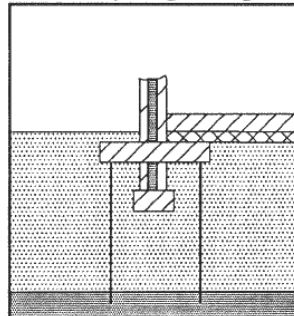
Stitch Piling



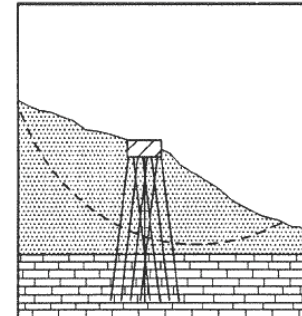
Restricted Headroom and Access



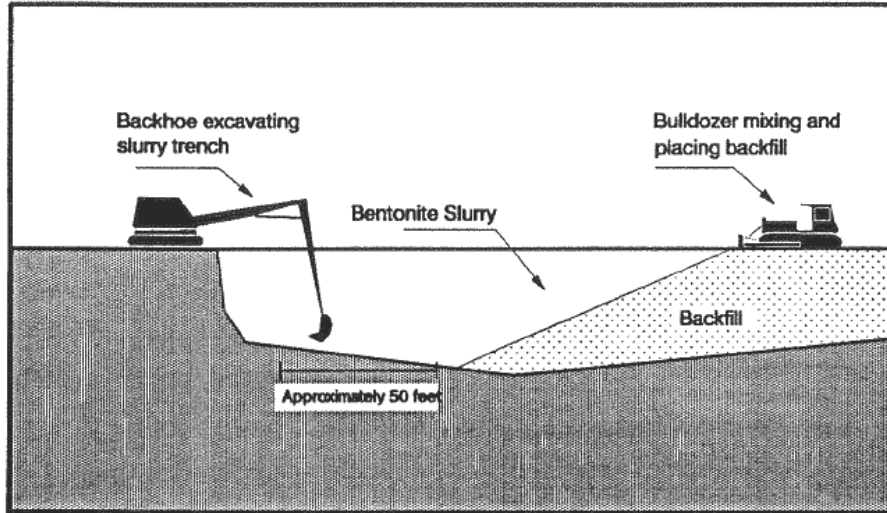
Underpinning Buildings



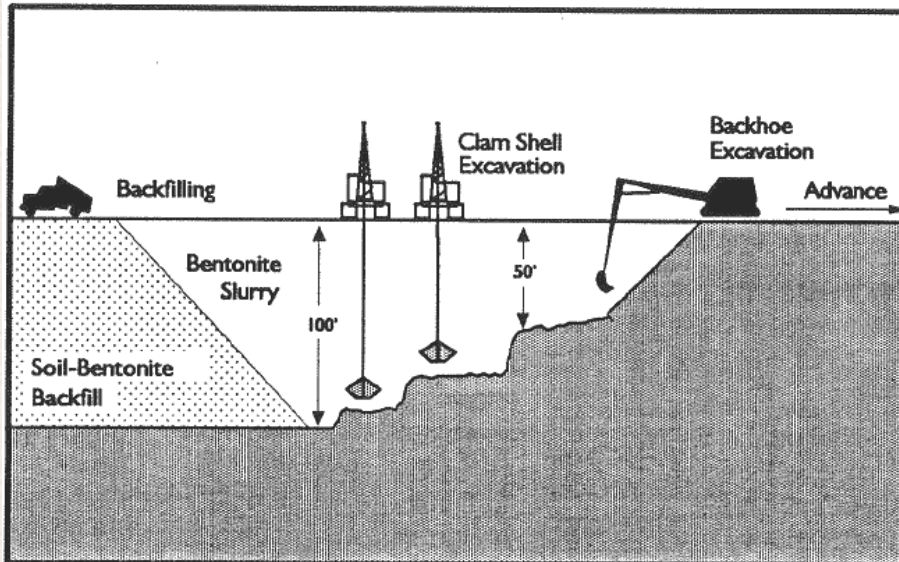
Stabilize Slopes



Shallow Excavation

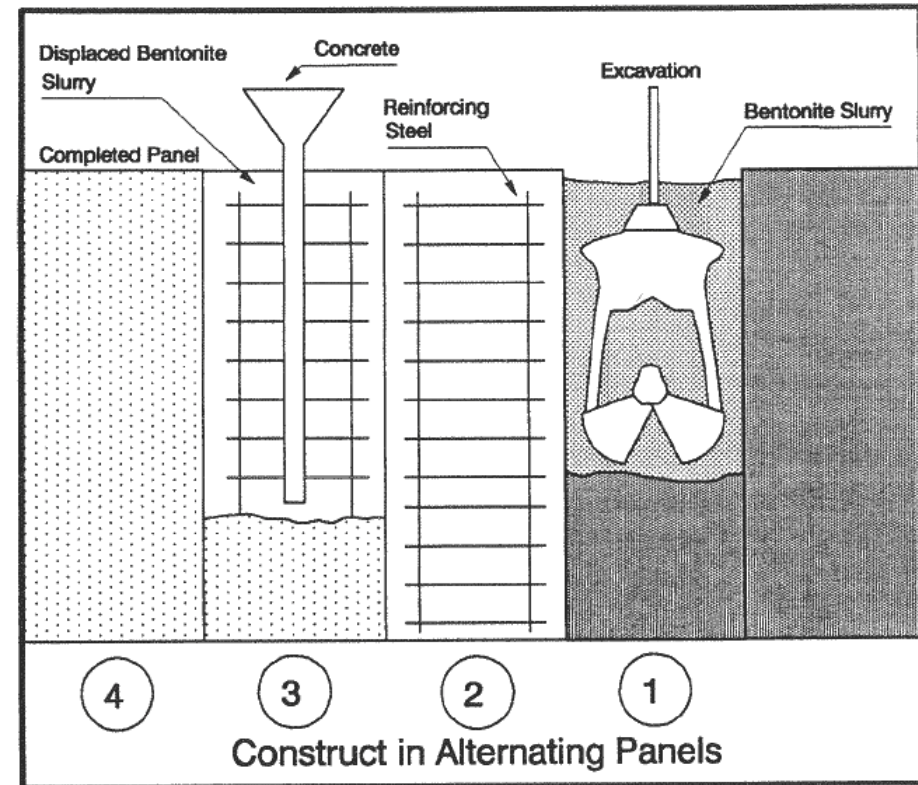


Deep Excavation



Diaphragm (Structural) Slurry Wall Applications

- Retaining walls
- Heavy foundations
- Combination retaining wall-foundations
- Combination retaining wall-water control
- Associated with the up-down construction technique as basement walls

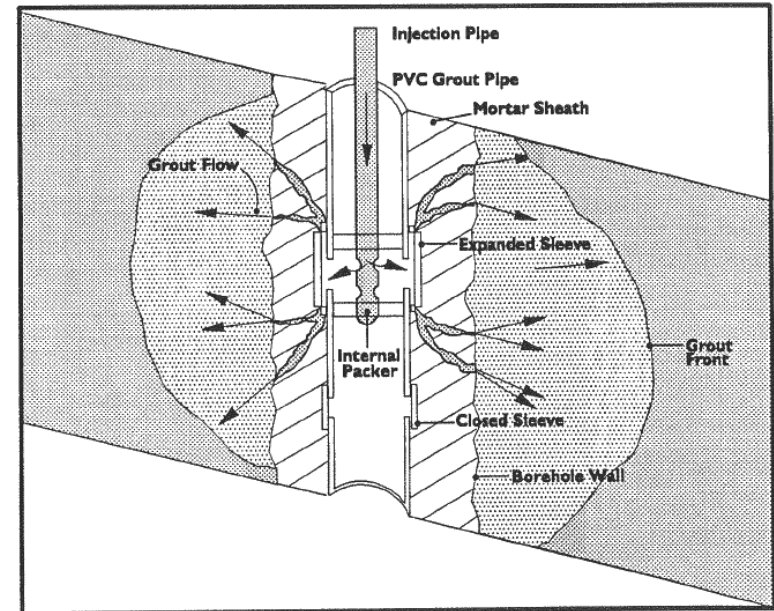
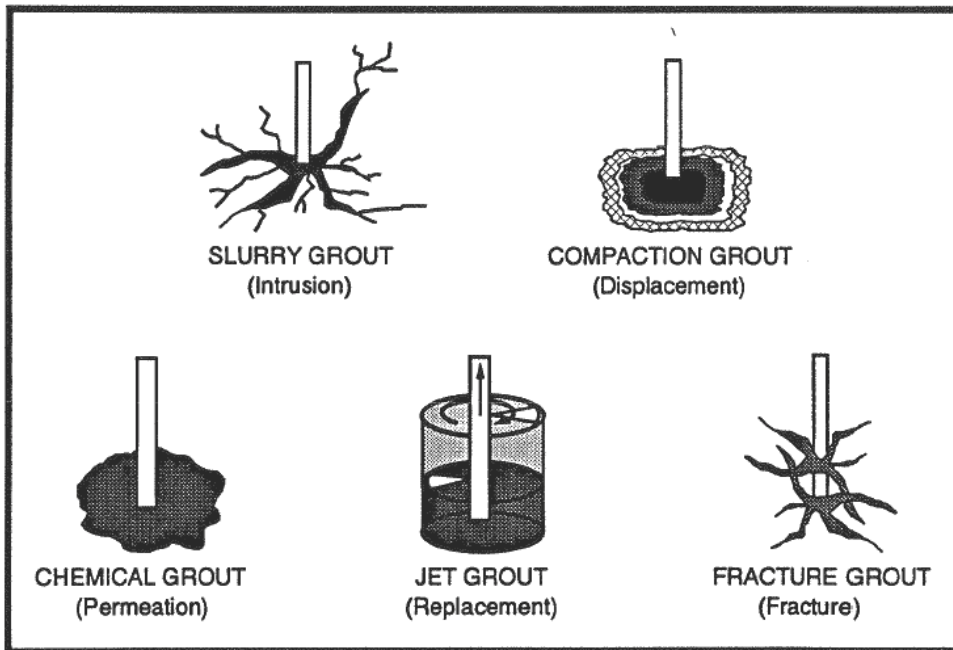


General Grouting

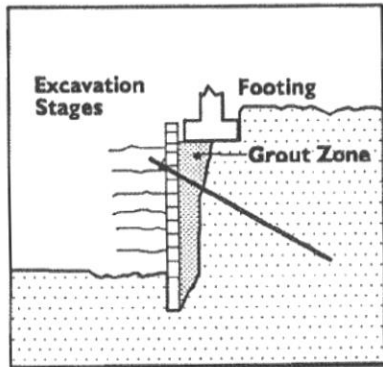
Grouting is...

The injection of pumpable materials into a soil or rock formation to change the physical characteristics of the formation.

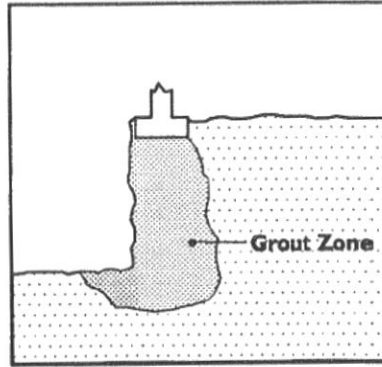
Types of Grouting



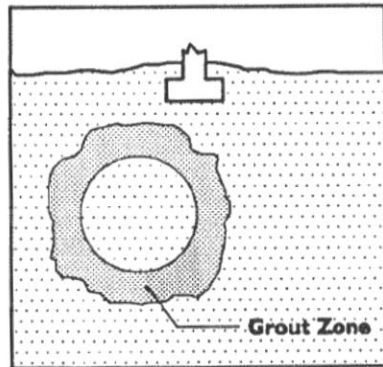
Chemical "Groutability"



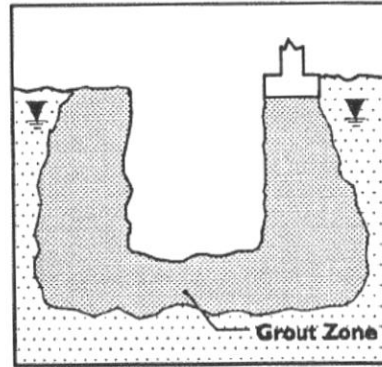
(A) For Lagging Operation



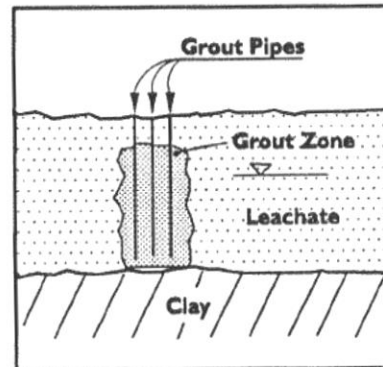
(B) Support of Footing



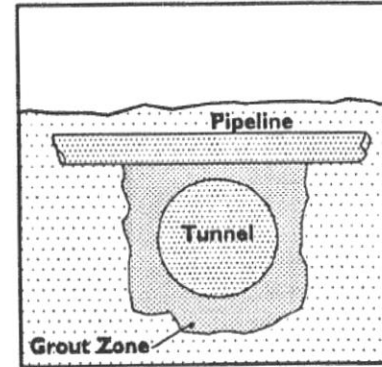
(C) Grouted Tunnel Support



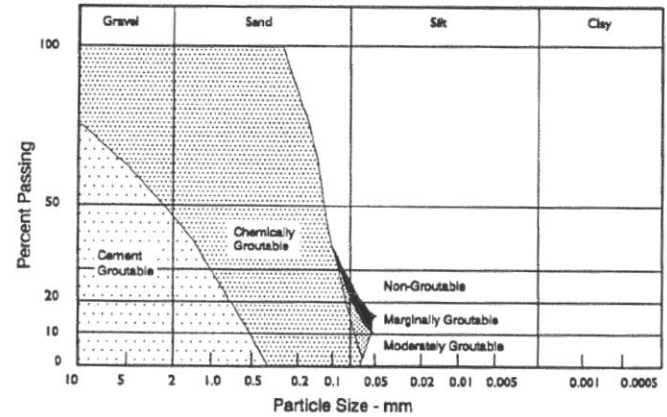
(D) Pit Excavation Below Water



(E) Grouted Cut-Off Wall



(F) Grouted Pipeline Support



Grain-Size Ranges for Chemically Groutable Soils



Dinamik kompaksiyon



Vibroflotasyon



Taş Kolon