Recycling Construction Demolition Debris for Stormwater Management

BMP Case Studies:
South Shore High School Demolition & Rosenblum Park

Presented by:
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Objective

• Recycling Concrete Aggregate (RCA) for stormwater management
  – Sustainable
  – Cost Effective
  – Maximizes Usable Land
  – Fine Particle Deposits
  – Sedimentation Considerations
Location

- South Shore Neighborhood of Chicago
- Loose to Medium Dense Brown Sand
- Infiltration Rate: 2.5 in/hr
Project Background

Site: South Shore High School

Building Footprint: 50,000 sq.ft.

Concrete Debris Estimate: 20,000 cu.yd.
Project Background

- Client - Public Building Commission of Chicago
- Permitting Agency - City of Chicago DWM
- Demolition Budget - $3.5 Million
- Construction Costs - $2.5 Million
- Improvements Area - 9.7 acres
- Required Detention - 1.5 acre-ft
- Storage Provided - 2.5 acre-ft
Traditional Building Demolition

- Salvage
- Recycle
- Bury
- Landfill
- CCDD
CCDD

• Clean Construction or Demolition Debris revisions
• Resulting in high export cost
• Critical to balance the concrete and earthwork
Detention in Stone

- Utilized a void ratio of 38% for CA-1
- Validated by field tests
Recycled Concrete Aggregate

- Reduces the need for gravel mining
- Reduces hauling costs
- Reduce the concrete debris to CCDD
- On-site Crushing and Screening equipment becoming more common
- Versatile enough to be substituted for many virgin stone applications
- Cost effective at 2,000 cu.yd.
Complications of using RCA

- Leaching results in high pH
- Fine particle are self-cementing
Infiltration Basin
Infiltration Basin Design

EXISTING TOP OF FOUNDATION

FINISH GROUND ELEVATION

CUT OFF WALL ELEVATION

SEWER PROTECTION FROM GROUNDWATER

SEASONAL HIGH GROUNDWATER LEVEL

EXISTING BASEMENT

BASEMENT BOTTOM

INFILTRATION BLANKET

DETENTION

INfiltration ONLY

RCA CA–1

4” CORED HOLES

RCA CA–6
Basin Drainage Design
Basin Drainage Design

FINISH GROUND ELEVATION
CUT OFF WALL ELEVATION
SEWER PROTECTION FROM GROUNDWATER
SEASONAL HIGH GROUNDWATER LEVEL

PERFORATED PIPE
3.5'

Primera
Basin Drainage Design
Basin Drainage Design
Basin Drainage Design
Basin Drainage Design

- Finish Ground Elevation
- Cut Off Wall Elevation
- Sewer Protection From Groundwater
- Seasonal High Groundwater Level
- Perforated Pipe
- 3.5’
Basin Drainage Design
Basin Drainage Design
Basin Drainage Design

FINISH GROUND ELEVATION

CUT OFF WALL ELEVATION

SEWER PROTECTION FROM GROUNDWATER

SEASONAL HIGH GROUNDWATER LEVEL

3.5'

PERFORATED PIPE
Basin Drainage Design

- Finish ground elevation
- Cut off wall elevation
- Sewer protection from groundwater
- Seasonal high groundwater level
- Perforated pipe
- 3.5'
Basin Drainage Design
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3.5'
Basin Drainage Design

- Finish ground elevation
- Cut off wall elevation
- Sewer protection from groundwater
- Seasonal high groundwater level

3.5'
Basin Drainage Design
Abatement
Demolition
Demolition
Recycle
Excavation
On-Site Crushing and Screening
On-Site Crushing and Screening
Backfill and Compaction
Backfill and Compaction
Stormwater Distribution
Compact and Cover
Park Improvements
Park Improvements
Park Improvements
Conclusion

• RCA reduces the concrete debris to CCDD facilities and hauling costs
• As stormwater management it will maximize usable land
• Design considerations must be made for fine particle deposits and sedimentation
References

• http://www.epa.state.il.us/land/ccdd/index.html
• http://www.fhwa.dot.gov/legsregs/directives/policy/recmatpolicy.htm
• http://www.concreterecycling.org/
Questions

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