Recycle Your Roadways with Full Depth Reclamation

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2012 APWA SUSTAINABILITY IN PUBLIC WORKS CONFERENCE
1) Recognize the environmental, economic, and social benefits of recycling road base materials.

2) Compare FDR as a design alternative to traditional excavation and rock base construction.

3) Plan and implement reclamation projects using the FDR process.

Video.....
What is FDR?

FDR = Full Depth Reclamation
Start with a failed pavement

Pulverize the road way
What is FDR?

- Spread Portland Cement
- Mix in Cement and Water
What is FDR?

- Compact with Sheep foot
- Solid road base
What is FDR?

- Graded
- Finish Rolled
What is FDR?

Then Pave it.
Full Depth vs. Partial Depth

- Full Depth Reclamation
  - on unimproved street

- Partial Depth Reclamation
  - RECLAMATION
    - Curb & gutter
Major Arterial, 25,000 ADT & Bus & Truck route

- Reclamation section
  - 2,200-ft, 3 lanes section
  - Existing pavement
    - 5-inches AC
    - 6 to 8 inches bar-run
    - clay subgrade
  - Excessive overlaid crown
- 3 signalized intersections

- West 18th Avenue
- Urban Arterial Street
Mix Design

- Sample
- Lab Testing for mix design
ICTB Mix Design

- Lane County PW Testing Lab
- 12” Depth ICTB
- 8% (+/-0.5%) Cement content
- 50% rock, 50% native clay
- 13-14% Moisture (2% below optimum)
- 98% of max density compaction
- 250-450 psi 7 day compressive strength
Materials – In-Place Cement Treated Base

- In-Place Cement Treated Based (ICTB)

Existing road base
Big rock and Clay

Portland Cement

Water
Issue – Grade Control

- Excessive overlaid crown
  - Drop crown up to 0.4 ft. (~5”)
- Design a profile
- Working the base between curb and gutter
- Matching side streets
Design for Utilities

- City Storm and Sanitary
  - Problem lowering poured in place MH’s

- NW Natural Gas
- EWEB – Water Utility
Construction

- Urban Arterial 18,000 ADT
- Major bus routes
- Major traffic control
- Close half width
- Work 20 ft. sides
Equipment Size

- Reclaimer machine
- Compaction
Process

- Spreading Cement
- Mix in cement & water
Process

- Compacting

- Grading
Remember the Mix Design

- From Lab to Construction
  - 12” Depth ICTB
  - 8% (+/-0.5%) Cement content
  - 50% rock, 50% native clay
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  - 98% of max density compaction
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- Lab Testing for mix design
Field Testing and Quality Control

- ICTB Construction
- Check depth with probe
- Test Moisture
- Test Compaction

- Scientific Process
- Baking pan to check cement application
Communication/Contractor prep

- Equipment train
- Communications
Issue – Mixing and Grading

- Working adjacent to Curb and gutter
- Working around structures
Utilities Research

- Abandon Utilities
Timing

- Timing of ICTB
  - Initial mixing/tilling the material
  - Excavate to desired grade, estimating fluff
  - Spread Portland Cement
  - Remix/till with water, now time is critical
  - Grading and compaction completed within 3 hours from mixing
    - ICTB was hard after 3 hours

- Solid at 3 hours
Safety

- Big equipment
  - Throwing rocks
- Dust control
Finished Product
Sustainable Benefits of Reclamation

- Environmental
- Economic
- Social
Environmental

- Use of existing rock base material
- Excavation and trucking saved
  - 5,000 CUYD excavation saved
  - 500 truck trips minimum (if back haul rock)
- No rock imported
  - 9,500 tons rock mining saved
- Negative - 402 tons of cement
## Economic and Social

### Economic
- Constructed 10,000 SQYD base
- Reclamation ICTB
  - $80,000
  - Including extra pipe work
- 18 inches traditional rock reconstruction
  - $215,000
- 12 inches traditional CTB
  - $250,000
- Savings
  - $**135,000** over traditional rock base

### Social
- Fast construction
  - Saved 3-4 weeks lane closures construction time estimated
    - Significant public savings
    - Less Businesses impact
Sustainability

- Environmental
  - Reuse of existing material

- Economic
  - Saves real money

- Social
  - Saves construction time
    - Less public inconvenience