Where Did All the Barracks Go?

An Innovative Approach for Salvaging, Reusing, and Recycling WWII Barracks, Ft. Lewis, WA

Elizabeth Chien     Matt Schultz     Tom Napier
Introduction:

- Army Policy
- Ft. Lewis Sustainability Goals
- No Impact to Budget or Schedule
- USACE - New Approach to Demolition
  - Contracting
  - Contractor Education
  - Comprehensive Team Approach
Project Summary:

- Battle Simulation Center Demo
  - Military Construction Project
  - Contract Award (incl. bonus) $693,500
  - SOW = Hazmat Survey, Hazmat Abatement, Demolition, Site Restoration
  - 50% diversion, by weight, required
  - Bonus for increasing levels of diversion
Project Summary:

- Battle Simulation Center Demo
  - 48,951 sq. ft. non-footprint demo
  - 12 WWII era wood buildings
    - 5 two-story barracks
    - 1 one-story mess hall
    - 1 one-story warehouse
    - 2 one-story classrooms
    - 1 one-story latrine
    - 1 one-story day use room
    - 1 two-story gymnasium
  - 8-days for HazMat/UST/AST/LCS/PCS Abatement
  - 2-3 days for removal (2-story barracks) using hybrid demolition/deconstruction techniques
- Period of Performance – August 2006 – January 2007
Project Summary:

- Battle Simulation Center Demo
  - WWII light frame wood buildings
  - Primarily pier and post foundation
  - Some concrete slab
  - CAB siding over wood siding
  - Wood siding, etc. with lead-based paint
  - Hazardous Material (ACM, LCM, Mercury, low-level rad, ozone depleting sub., PCB ballasts, fluorescent lamps)
Material Summary:
Hazardous Material
70 tons

- Metalbestos Pipe
- Transite Siding
- Concrete Flooring
- Sheetrock/Windows
- Fluorescent Lambs
- PCB Ballasts
- Flooring/Tile
- Mercury Switches
- Radioactive Exit Signs
- Halide Lamps
- Smoke/Heat Detectors
- Batteries
- R-22 Refrigerant
- Misc. Friable ACM
## Material Summary:
**Non-hazardous Material**

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shrub/Landscape Material</td>
<td>4,490 tons</td>
</tr>
<tr>
<td>Top Soil</td>
<td></td>
</tr>
<tr>
<td>Petroleum-Contaminated Soil</td>
<td></td>
</tr>
<tr>
<td>Non-Haz Lead-Contaminated Soil</td>
<td></td>
</tr>
<tr>
<td>Clean Wood</td>
<td></td>
</tr>
<tr>
<td>2x4 Lumber</td>
<td></td>
</tr>
<tr>
<td>Other Dimensional Lumber</td>
<td></td>
</tr>
<tr>
<td>Non-Structural Lumber</td>
<td></td>
</tr>
<tr>
<td>T-111 Siding</td>
<td></td>
</tr>
<tr>
<td>Recovered Fuel</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td></td>
</tr>
<tr>
<td>Asphalt</td>
<td></td>
</tr>
<tr>
<td>Brick and Other Masonry</td>
<td></td>
</tr>
<tr>
<td>Recycled Metal</td>
<td></td>
</tr>
<tr>
<td>Chain-Link Fence</td>
<td></td>
</tr>
<tr>
<td>Salvaged Steel</td>
<td></td>
</tr>
<tr>
<td>Raised Computer Floor</td>
<td></td>
</tr>
<tr>
<td>RF Computer Filter</td>
<td></td>
</tr>
<tr>
<td>Misc. Co-mingled Debris</td>
<td></td>
</tr>
<tr>
<td>Recovered Fuel</td>
<td></td>
</tr>
</tbody>
</table>
Where Did It All Go:

- **Ft. Lewis Earthworks Facility**
  - Asphalt/Concrete/Brick: crushed and reused on post as road bed
  - Vegetation: composted or mulched for reuse in post landscaping
  - non-haz LCS: reused as fill material at Landfill #2
  - PCS: treated then reused as fill or mixed into compost pile
  - Excess clean soil: reused to reclaim post borrow pits, returning site to native prairie
Where Did It All Go:

- Ft. Lewis Army units for Training
  - Small dimensional lumber: building practice detention center, decks for community buildings, urban village
  - Windows/Doors: Reused at other buildings, practice structures, urban village
  - Raised Flooring: Reused at other buildings
  - Landscape Plants: part of soldier rehab program for returning vets, building decks and landscaping at community buildings
Where Did It All Go:

- Olympia Salvage: Materials Reuse Store
  - Clean, re-usable lumber
  - Clean, large dimensional lumber
  - Building Materials (sinks, lights, urinals, toilets, windows, fixtures, hardware)
Where Did It All Go:

- Local Metal Recycler: sold for profit
  - Ferrous metals
  - Non-ferrous metals (mostly copper)
  - USTs/ASTs
  - Nails
  - Heat pumps
  - Electrical panels
  - Air conditioners
Where Did It All Go:

- Weyerhaeuser
  - Misc. C&D Co-mingled Debris (painted wood, blinds, carpet/pad, insulation, glass, sheet rock, curtains, ceiling tile, etc.): remanufactured into daily cover for beneficial reuse
Where Did It All Go:

- ARI – Lead Recovery Pilot Test
  - Selected painted wood: wood mill then resold paint shavings used in lead recovery test
Where Did It All Go:

- **MCS:**
  - Excess UST/AST Fuel: reused as fuel for equipment

- **Local Recycler:**
  - Cans
  - Bottles
  - Paper

- **Individuals:**
  - Brick
  - Metal
  - Lumber

- **Hazardous Material:**
  - ACM: ACM landfill
  - Other HazMat: Ft. Lewis handled disposal
Exciting Results:

- Historical/Cultural Items
- Facilitation/Team Collaboration
- Soldier Rehab
- Great Community Press/Outreach
- Assist Army Units Training
- Fun Stories
Frustrating Issues:

- Limited interest in re-usuable materials
- Too much interest in stacks of material
- Midnight raiding
- Lead in soil – in spite of:
  - Min. Soil Disturbance
  - Deconstruction
  - Good Housekeeping
- Lead-Based Paint
- Lack of Recycling Opportunities for Sheetrock
- Preparing site for new construction
- Initial learning Curve
## Budget Comparison:

<table>
<thead>
<tr>
<th></th>
<th>Trad. Demolition*</th>
<th>Battle Sim Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>HazMat Survey</td>
<td>= $1.00-$2.00/sf</td>
<td>HazMat Survey</td>
</tr>
<tr>
<td>HazMat Abatement</td>
<td>$4.00-$4.50/sf</td>
<td>$1.50/sf</td>
</tr>
<tr>
<td>Fac. Removal</td>
<td>$8.00-$9.50/sf</td>
<td>$4.00/sf</td>
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</tbody>
</table>

### Total

|                      | $13/sf - $16/sf  | $14.20/sf          |

* Pacific NW Region

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US Army Corps of Engineers
<table>
<thead>
<tr>
<th>Schedule Comparison:</th>
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</thead>
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<table>
<thead>
<tr>
<th></th>
<th>Trad. Demolition</th>
<th>Battle Sim Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abatement =</td>
<td>6-8 days</td>
<td>6-8 days</td>
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<tr>
<td>Other</td>
<td>2-4 days</td>
<td>2-4 days</td>
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<tr>
<td>Demo</td>
<td>1-2 days</td>
<td>2-3 days</td>
</tr>
<tr>
<td>Total</td>
<td>9-14 days</td>
<td>10-15 days</td>
</tr>
</tbody>
</table>

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Summary:

- 12 WWII Wood Buildings Removed Using Hybrid Demo/Deconstruction Techniques
- 100% Diversion of Non-hazardous C&D Debris from Landfill
- No Change Orders/Contract Mods
- Within Schedule, Within Budget
- Same Results with the Next 15 Buildings that were a Follow-on Project to This One
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- Ron Knutson – MCS Environmental
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- Rebekah Barker – USACE - Seattle
- Rich Littoy – USACE - Seattle
- Steve Perrinot – Ft. Lewis, Deputy Garrison Commander
- Paul Steuke – Ft. Lewis Public Works, Chief of Environmental Div.
- Ken Smith, Ft. Lewis Public Works, Chief of Environmental Ops.
- Ron Norton – Ft. Lewis Public Works, Environmental Operations
- Brendalyn Carpenter – Ft. Lewis Public Works, Sustainability
- Dave Bennink – Re-Use Consulting
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