



# Uranium Processing Facility

Dale Christenson





# Project Background

- Mission Need

“Provide safe, efficient, and secure enriched uranium processing and storage within the Nuclear Weapons Complex to meet the mission of the U.S. Department of Energy’s National Nuclear Security Administration”

- Revised CD-1 approved in June 2012

- Build a capability sized UPF to replace Building 9212 enriched uranium capabilities
- Updated cost range to \$4.2B to \$6.5B
- Included \$2B of contingency
- Use a build to budget acquisition strategy



# Project Challenges

- Space / Fit Risk Realized
  - Facility too small based upon mature equipment design
  - Increased cost by ~\$500M and one year delay
- Commodity and Design Cost Increases
  - Mature design revealed increases in facility commodities
  - Increased project cost by ~ \$1 Billion
- Budget Control Act Cost Increases
  - Sequestration reduced projected funding
  - Increased project cost by ~ \$2 Billion
- NNSA Evaluation and Decision
  - NNSA projected cost range to be \$10B to \$12B
  - NNSA recommended alternative design approaches



# NNSA's Design Policy

- NNSA committed to achieving 90% design completion prior to establishing UPF baseline
- As design matured, and updated estimates are developed, costs monitored against CD-1 range
- NNSA leadership allowed an opportunity to make adjustments
  - Adjust program requirements
  - Consider alternative design approaches
  - Execute build to budget strategy
  - Charter a Red Team to review and validate changes

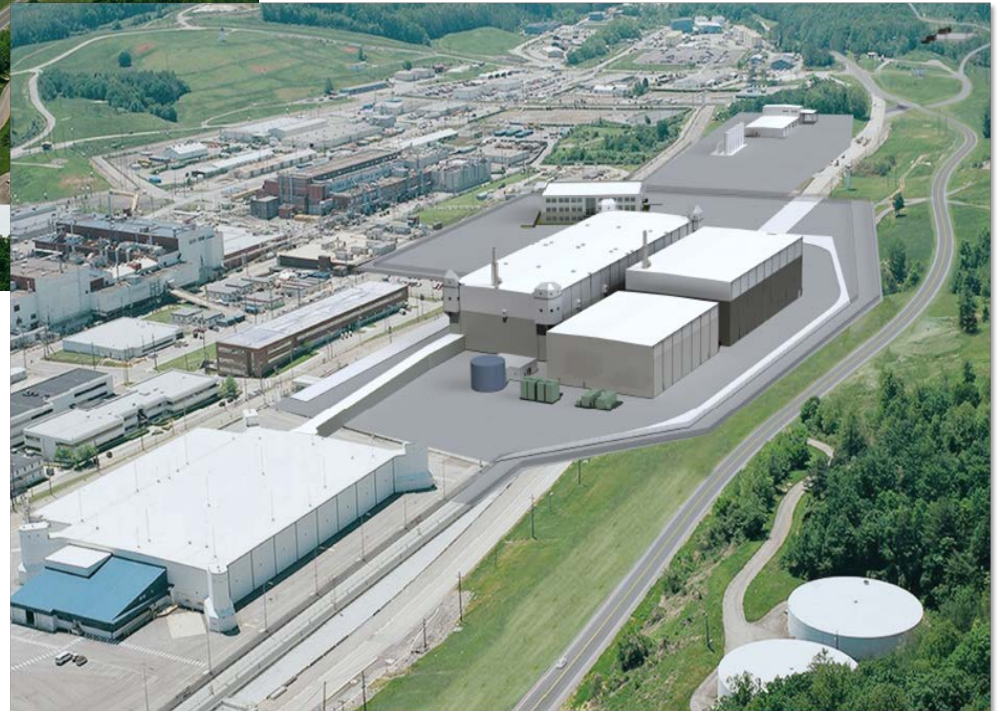




# Design Concept



Original Design Approach  
- Single Building



Revised Design Approach  
- Multiple Buildings



# Revised Design Approach

- Allows tailoring of safety, security, and quality requirements by building
- Maximizes execution flexibility to achieve construction and startup
- Takes maximum advantage of existing process design
- Aligns with revised program requirements



# Requirements Identification

|         | Requirements                         |
|---------|--------------------------------------|
| Defined | Uranium Mission Requirements         |
|         | UPF Program Requirements Document    |
|         | UPF System Requirements Document     |
|         | Validated Design Agency Requirements |
|         | Code of Record                       |
| Derived | Safety Design Strategy               |
|         | Security Requirements Document       |
|         | Operations Requirements Document     |
|         | Design Criteria                      |



# Requirements Stability

- Design Code of Record (COR)
  - Approved by the FPD
  - Under NNSA Configuration Control
- Senior Management Change Control Board
  - Chaired by UPF FPD
  - Participation by Field Office, Project Office, and Project







# UPF Project Execution Strategy

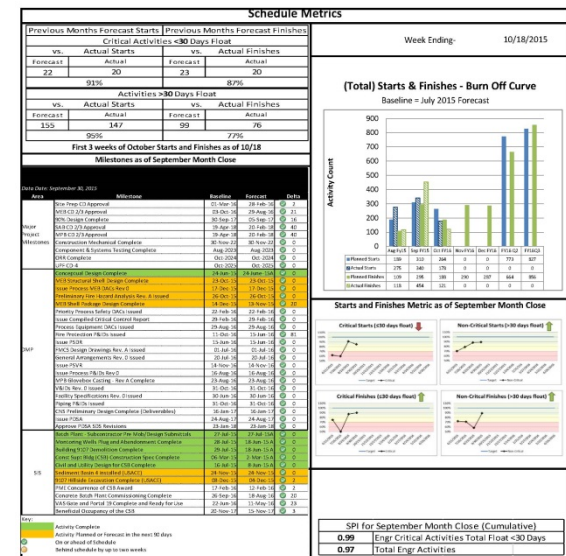
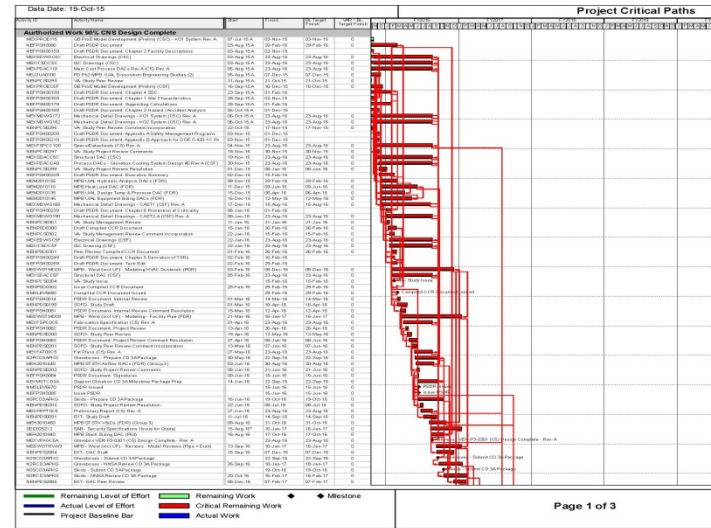
- Aligned with DOE Order 413.3B and S-1 Project Management Policy
  - Phased approach to execution using subprojects
  - Nuclear subprojects will complete 90% design before baselining (CD-2)
  - Independent Cost estimates/reviews will be performed for all subprojects
  - Technology Readiness of TRL 7 prior to CD-2
  - Annual Peer Reviews
  - Design Management Plan for project engineering and design efforts to achieve CD-2 fully baselined



# UPF Design

- Design Management Plan

- Defines all activities to complete design
- Identifies all activities to achieve CD-2/3
- Over 11,000 activities in the schedule
- Performance tracked using Earned Value metrics
- Technology Readiness activities fully integrated into the schedule





# Safety and Security Integration

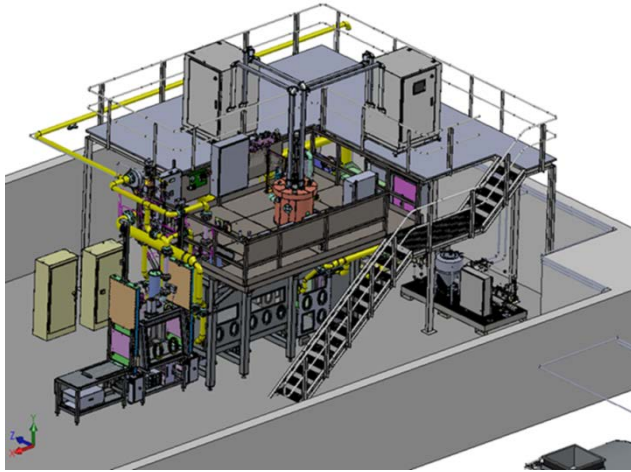
- Preliminary documents approved by risk acceptance official (Site Office Manager)
  - Safety Design Strategy, Conceptual and Preliminary Safety Design Report
  - Preliminary VA and Material Control / Accountability Plan
- Design changes reviewed for safety and security impacts and interfaces



# Technology Readiness

## Huntsville, Al

Microwave / Glovebox Testing with **Copper**



Microwave Casting System Model

## Oak Ridge, TN

Microwave / Glovebox Testing with **Depleted- Uranium (DU)**



Microwave Glovebox Fabrication

Design Complete  
Oct 2015

Cu Testing  
Start  
April 2016

DU Testing  
Start  
Aug 2016

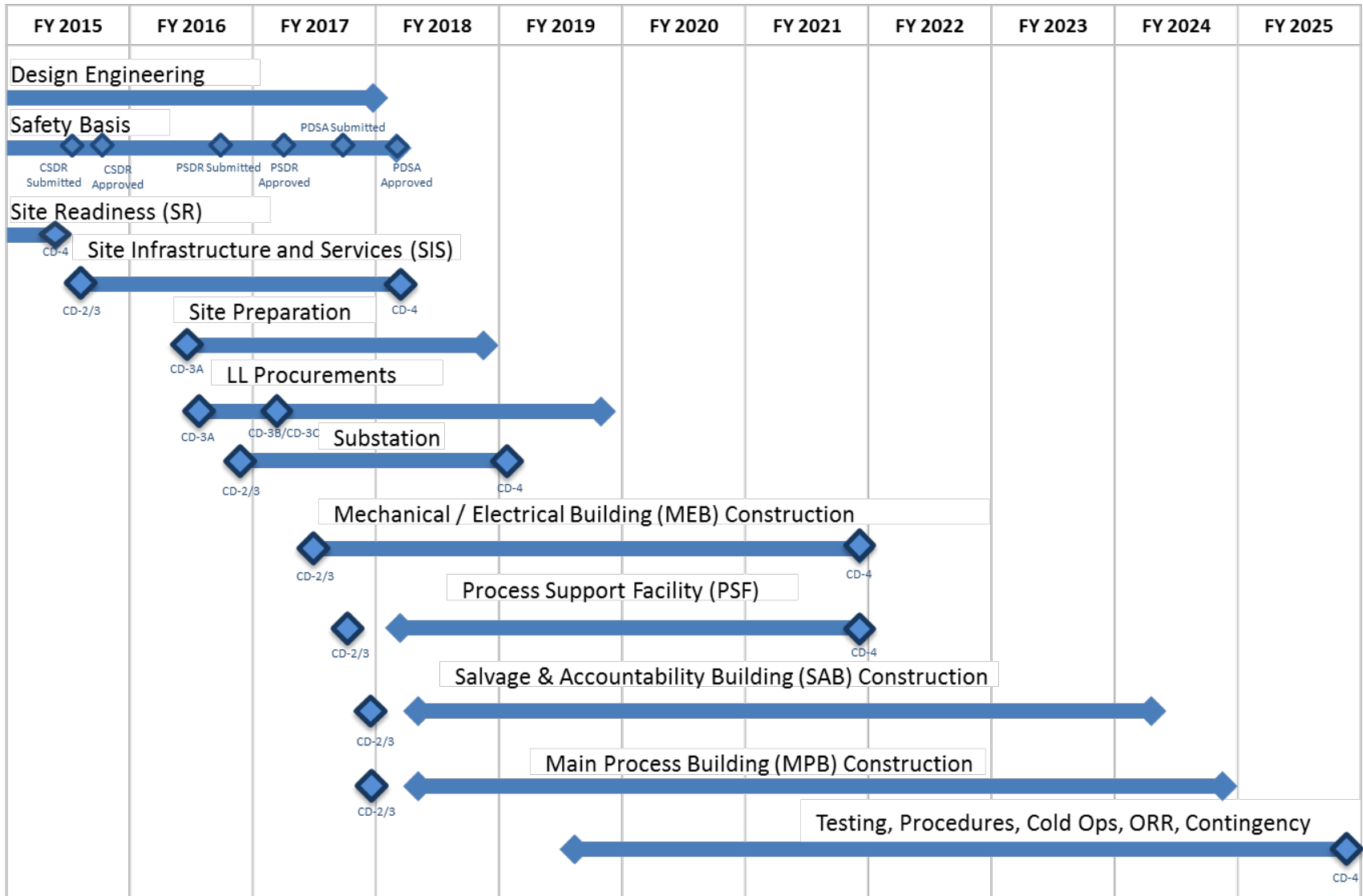
TRL 7  
Complete  
Aug 2017

MPB CD-2/3  
Submittal  
Sept 2017





# UPF Phased Execution Schedule





# Site Readiness

**CD 4 – February 2015**

**West borrow  
~5 miles**

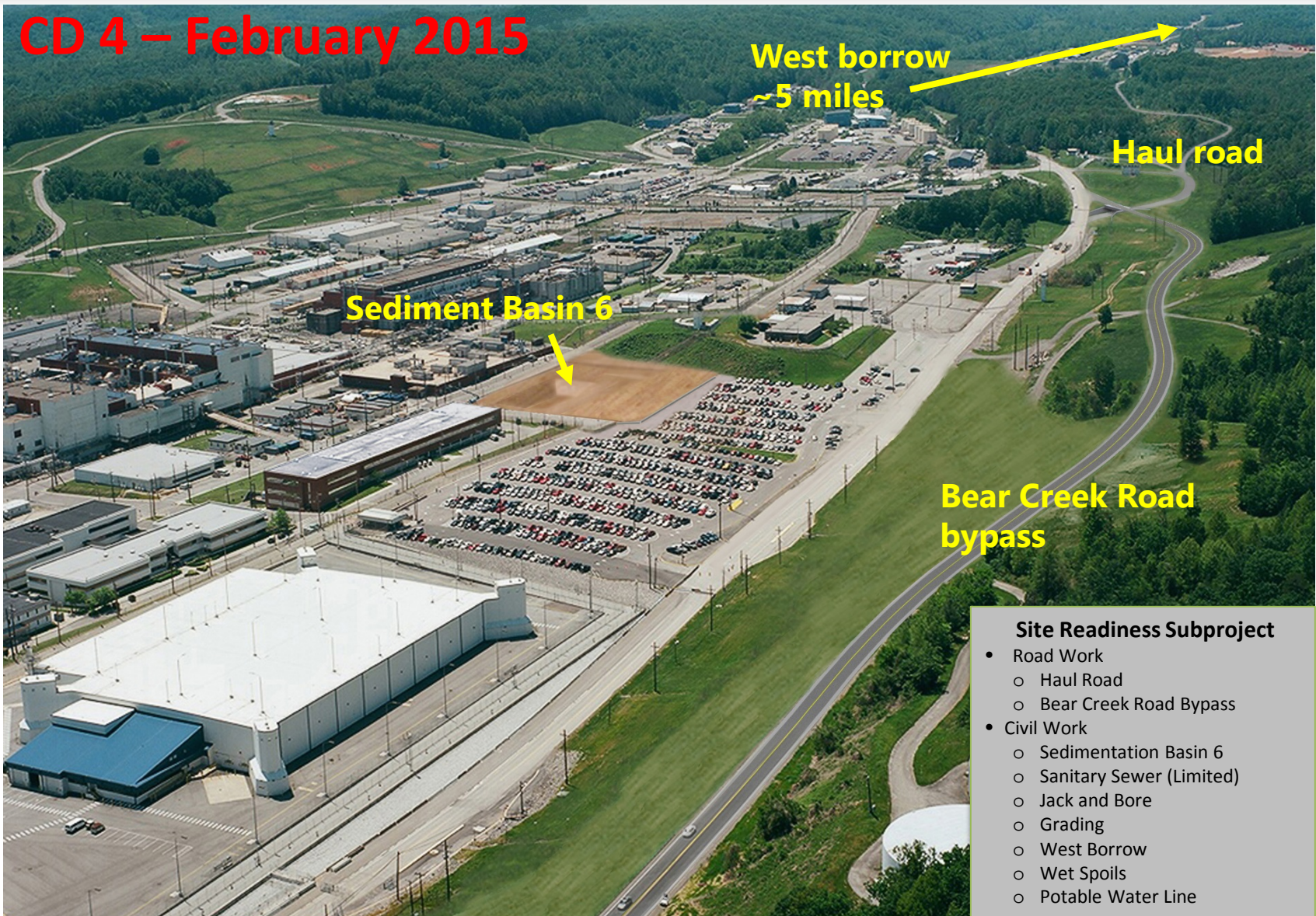
**Haul road**

**Sediment Basin 6**

**Bear Creek Road  
bypass**

## Site Readiness Subproject

- Road Work
  - Haul Road
  - Bear Creek Road Bypass
- Civil Work
  - Sedimentation Basin 6
  - Sanitary Sewer (Limited)
  - Jack and Bore
  - Grading
  - West Borrow
  - Wet Spoils
  - Potable Water Line







# Site Infrastructure and Services

**CD 2/3 – March 2015**

Concrete Batch Plant

Portal 19

Construction Support Building

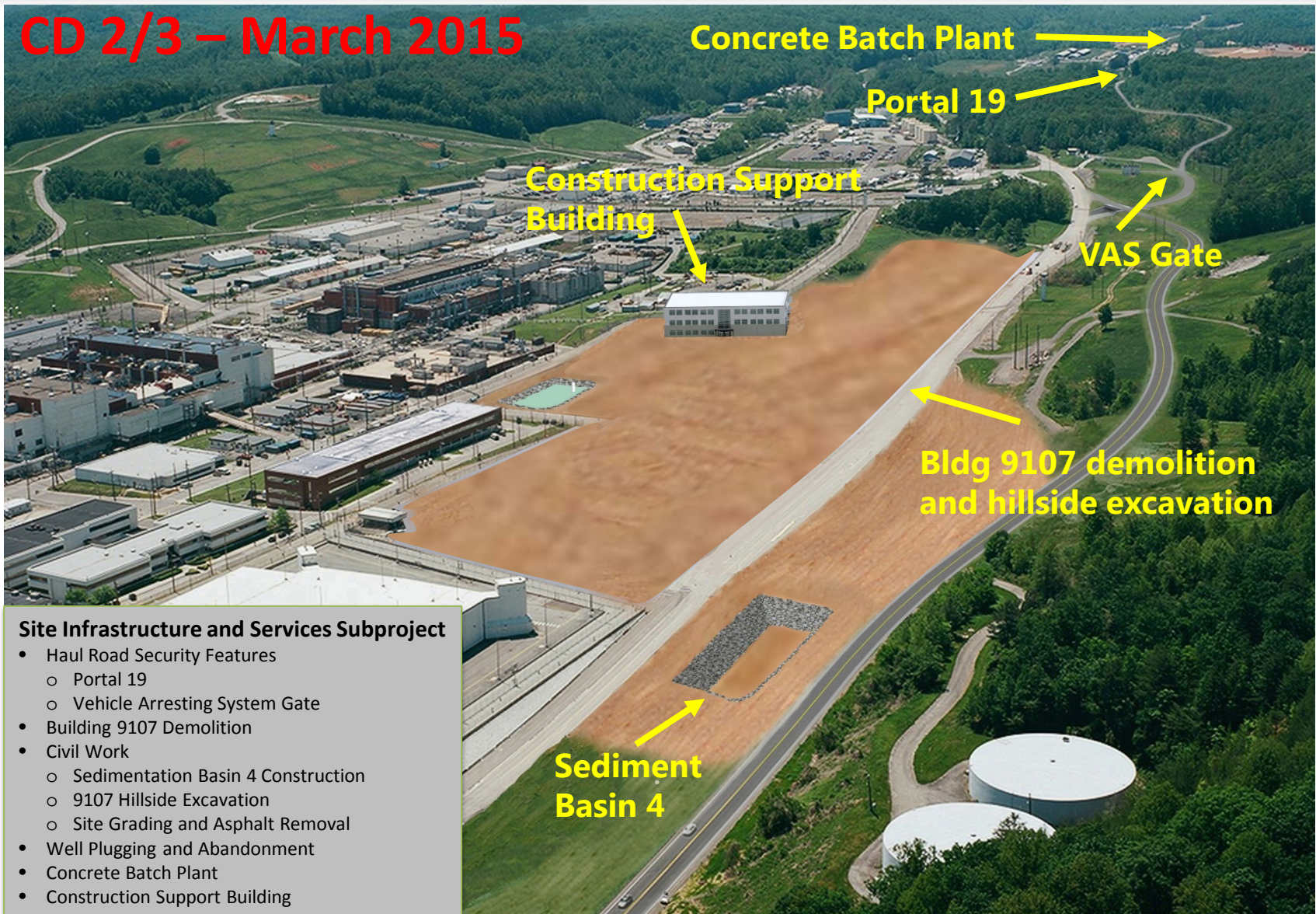
VAS Gate

Bldg 9107 demolition and hillside excavation

Sediment Basin 4

## Site Infrastructure and Services Subproject

- Haul Road Security Features
  - Portal 19
  - Vehicle Arresting System Gate
- Building 9107 Demolition
- Civil Work
  - Sedimentation Basin 4 Construction
  - 9107 Hillside Excavation
  - Site Grading and Asphalt Removal
- Well Plugging and Abandonment
- Concrete Batch Plant
- Construction Support Building

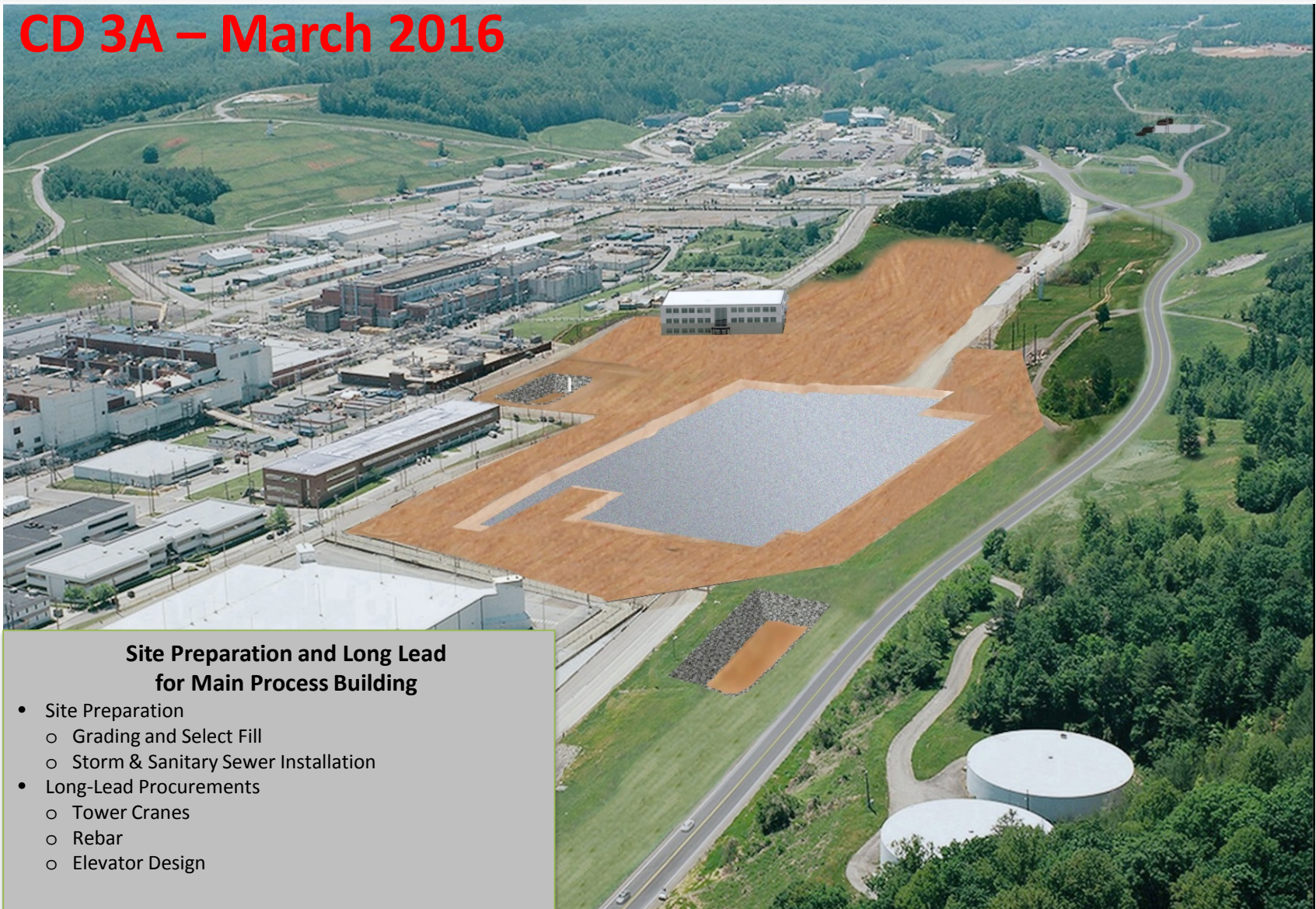






# Site Preparation and Long Lead

**CD 3A – March 2016**



## Site Preparation and Long Lead for Main Process Building

- Site Preparation
  - Grading and Select Fill
  - Storm & Sanitary Sewer Installation
- Long-Lead Procurements
  - Tower Cranes
  - Rebar
  - Elevator Design





# Mechanical/Electrical Building

CD 2/3 – 2<sup>nd</sup> QTR 2017



## Mechanical/Electrical Building Subproject

- MEB Foundation and Structure
- MEB Equipment
  - HVAC Air Handlers & Filters
  - Chillers
  - Electrical Switchgear & Transformers
  - Compressors
  - Pumps and Tanks
- Cooling Towers
- Warehousing and Laydown Area





# Salvage and Accountability

CD 2/3 – 4<sup>th</sup> QTR 2017



## Salvage and Accountability Building Subproject

- SAB Foundation and Structure
- SAB Equipment
- Personnel Support Building
- Balance of Facilities
  - Firewater Tanks & Pumhouse
  - Stand-By Diesel Generators





# Main Process Building

CD 2/3 – 4<sup>th</sup> QTR 2017



- Main Process Building Subproject**
- MPB Foundation and Structure
  - MPB Process Equipment
    - HVAC Air Handlers & Filters
    - Maintenance Equipment
    - Electrical Switchgear
    - Cranes/Hoists
  - PIDAS
  - HEUMF Connector



# Acquisition Strategies on UPF

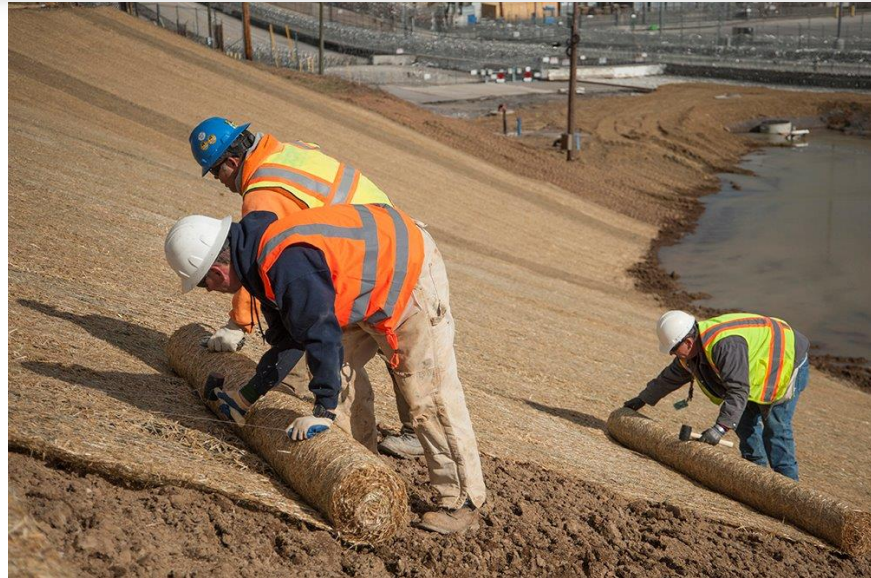
- Use of Management and Operating contract
  - Separate Contract Line Item for UPF Design and Construction
  - Separate Fee Model
- Use of Target Cost on M&O scope
  - Separated by clearly defined scope packages
  - CPIF share line fee model
  - All fee at risk until earned
- Leverage expertise for direct federal contracts
  - United States Army Corps of Engineers
  - Tennessee Valley Authority





# Site Infrastructure and Services

USACE/Emerald  
Sediment Basin 4 Erosion  
Control Mat Installation



USACE/Emerald  
Installation of New 48"  
Storm Drains East of the  
Future Construction  
Support Building







# Site Infrastructure and Services

CNS/Northwind Portal 19  
Concrete Pad Placement



CNS/Northwind Erecting  
Portal 19 Canopy Structure







# Site Infrastructure and Services

CNS Construction Concrete Placement for Sanitary Sewer Tie-In







# Uranium Processing Facility Project

