

2pgs

**Masters, Anthony**

---

**From:** Thomas, George  
**Sent:** Tuesday, December 29, 2009 9:04 AM  
**To:** Lake, Louis  
**Cc:** Khanna, Meena; Franke, Mark; Farzam, Farhad; Carrion, Robert; nausdj@ornl.gov; Masters, Anthony  
**Subject:** CR-3 Revised Engineering and Repair Work Flow Chart as of 12-28-09  
**Attachments:** Engg & Repair Work Flow 12-28-09.pdf  
**Categories:** Perform Review

Attached is the revised (as of 12-28-09) Engineering and Repair Work Flow chart for CR-3.

Thanks.  
George

**Revision – Dec 28<sup>th</sup> 2009**  
**Engineering & Repair Work Flow**

The flowchart illustrates the repair process for a bridge deck, starting with an initial assessment and moving through various engineering and construction tasks. The process is divided into two main sections: 'Repair Preparations' and 'Permanent Repair'.

**Repair Preparations (Left Side):**

- SGT Engineering & Construction Input (Repair Preparations)** (Top Left)
- EC Mod Phase 1 Crack Arrest EC 75000** (Middle Left)
- Implement Crack Arrest Strategy** (Bottom Left)
- RCA Failure Modes Analysis Cross Check** (Bottom Left)
- MPR Calc on Tendon # & Sequence** (Top Left)
- PII Abaqus Analysis of MPR Tendon # & Sequence** (Middle Left)

**Permanent Repair (Right Side):**

- EC Mod Phase 2 De-tensioning EC 75218** (Middle Left)
- De-tension Additional Tendons** (Bottom Left)
- EC Mod Phase 3 Removal EC 75219** (Middle Left)
- Delamination Removal** (Bottom Left)
- EC Mod Phase 4 Placement EC 75220** (Middle Left)
- Reinforcement & Concrete Placement** (Bottom Left)
- EC Mod Phase 5 Re-Tensioning EC 75221** (Middle Left)
- Re-tensioning & Post-Repair Testing** (Bottom Left)

**Analysis and Calculation Tasks:**

- Δ S&L Calc: Loss of Decay Heat Removal (for fuel load)** (Top Right)
- Δ S&L Calc: Polar Crane Loads** (Top Middle)
- MPR 3D Finite Element Analysis** (Top Middle)
- MPR Tendon Analysis Sequence** (Top Right)

**Final Steps:**

- Load fuel (date TBD)** (Top Right)
- Δ EC 75218 Rev** (Top Right)
- Final Root Cause Analysis** (Bottom Right)

The flowchart uses arrows to indicate the sequence of tasks, with some tasks being concurrent or iterative. A dashed box labeled 'Permanent Repair' encloses the tasks from 'Reinforcement & Concrete Placement' to 'Re-tensioning & Post-Repair Testing'.

Δ S&L Calc: Loss of Decay Heat Removal (for fuel load) → Load fuel (date TBD)  
Δ EC 75218 Rev

**SGT Engineering & Construction Input  
(Repair Preparations)**

**SGT Engineering & Construction Input  
(Permanent Repair)**

### MPR Calc on Tendon # & Sequence

### Δ S&L Calc: Polar Crane Loads

**MPR 3D  
Finite Element  
Analysis**

**MPR Tendon  
Analysis  
Sequence**

✓ EC Mod  
Phase 1  
Crack Arrest  
EC 75000

**PII Abaqus  
Analysis of  
MPR Tendon  
# & Sequence**

**EC Mod  
Phase 2  
De-tensioning  
EC 75218**

**EC Mod  
Phase 3  
Removal  
EC 75219**


**EC Mod  
Phase 4  
Placement  
EC 75220**

**EC Mod  
Phase 5  
Re-Tensioning  
EC 75221**

**Implement Crack Arrest Strategy**

**De-tension  
Additional  
Tendons**

## Delamination Removal



**Reinforcement  
& Concrete  
Placement**

### Re-tensioning & Post-Repair Testing

### Permanent Repair

✓ RCA Failure Modes Analysis Cross Check

### RCA Failure Modes Analysis Cross Check

### Final Root Cause Analysis