I-90 Construction Data

Project Background
Sections of Interstate 90 pavement in the Cascade Mountains are badly damaged and must soon be replaced. Some of the worst pavement is on eastbound I-90 from milepost 70 to milepost 73.64 (about Railroad Ave. to Nelson Siding Road in Easton, WA). More information can be found at:

- General location of things: [http://maps.live.com/default.aspx?v=2&cp=47.133774~~120.894907&style=r&lvl=10&tilt=-90&dir=0&alt=-1000&cam=32.606782~~116.970775&scene=6324514&cid=7D42DEA16EB3D22F101&encType=1](http://maps.live.com/default.aspx?v=2&cp=47.133774~~120.894907&style=r&lvl=10&tilt=-90&dir=0&alt=-1000&cam=32.606782~~116.970775&scene=6324514&cid=7D42DEA16EB3D22F101&encType=1) (or you can search for “CEE 404” collections on Windows Live Search Maps)

Project Scope
- Rehabilitate or remove and replace all mainline pavement from the two eastbound 12-ft wide lanes from MP 70.00 to 73.64. Shoulders, drop lanes and ramps are to remain as-is.
- Begin construction 7/11/2011 (it is a Monday) at 8:00 a.m. if you are analyzing continuous closure scenarios. Begin construction 7/15/2010 (it is a Friday) at 10:00 p.m. if you are analyzing weekend closure scenarios.
- There are three options: crack-seat-and-overlay (CSOL) with HMA or remove and replace with HMA or PCC. Parameters associated with each are discussed on the following pages.

![Project Location (from Windows Live Local)](image-url)
Demolition (for use with HMA and PCC Remove-and-Replace)

- Dump trucks: Fleet of 25 end dump trucks, each has a 15 yd$^3$ dump box. This translates to a capacity of about 30 tons of PCC if the bed were packed solid. Typically there is a packing efficiency associated with these demolition hauling trucks to account for the inefficient packing of this 15 yd$^3$ bed that naturally occurs with big, abnormally shaped chunks of concrete. So, a 15 yd$^3$ bed will not be able to carry 30 tons of PCC. It will carry something less. Figure out how much less using the readings.

- Number of demolition teams: no more than 3. If you use more than one you must show how access will work such that trucks servicing one team will not conflict with another.

- A site to temporarily store the demolition material has been secured about 1 mile south of Exit 74. Plans are to truck the material to this site where it will be rubblized for reuse in fill on another job.
**Remove and Replace with HMA**

**Structural Design**

![Diagram of pavement structure]

**Primary Equipment**

- Paver: one Caterpillar 1055D paver with a 12-ft wide Carlson screed
- Material transfer vehicle: one Barber-Greene BG-650 windrow elevator
- Dump trucks:
  - HMA: Fleet of 25 bottom dump trucks, 20 ton HMA capacity each
  - Base delivery: trucks come from asphalt fleet, 22 tons aggregate each
- HMA Plant: Granite Northwest, Inc. 250 ton/hr HMA plant located in Ellensburg, WA.
- Rollers: You must use rollers in the “breakdown” and “finish” positions. An “intermediate” roller is not required. You can use up to 3 of each roller. Rollers available (see Bomag website for details):
  - Breakdown: Bomag BW190AD-4 AM operated in low amplitude, high frequency mode. 4 passes need to achieve density based on the test strip.
  - Finish: BW 266 operated in static mode. One pass needed for smoothness only.

**Other Construction Information**

- Use a windrow paving technique with a windrow pick-up material transfer vehicle (MTV) in front of the paver. This technique means the paver is not required to stop while receiving mix (increases its efficiency).
- Your compaction goal is 94% of a 150 lb/ft³ theoretical maximum density. Do not use any thumbsrules for figuring out HMA density since it is given here.
- Mobilization takes 1 hour, demobilization takes 3 hours.
Remove and Replace with PCC

Structural Design

NEW PAVEMENT

- 12” PCC
- 10” lift of CSTC

EXISTING PAVEMENT

- 9” PCC
- Subbase

Other Design Parameters (for use with HIPERPAV)
- Design
  - Reliability: 95%
  - Geometry: 12 ft wide and 15 ft between transverse joints
  - Base Material: Unbound Aggregate Subbase
  - Subbase Thickness: 10 inches
- Mix Design
  - Use the 650 psi flexural strength mix design document from WSDOT. However, use 800 lbs of Type III cement instead of the 565 lbs of Type I-SM listed.
  - Aggregate Type: Granite/Gneiss
  - PCC 28-day strength = 750 psi by center point flexural beam.
- Construction
  - Initial PCC temperature = 80F, initial support layer temperature = 45F
  - Base is dry
  - Curing compound = single coat liquid, age cure applied = 3 hours
  - Saw at 5 hours
  - Strength required to open to traffic = 2,500 psi, compressive

Other Construction Information
- PCC Plant: Ellensburg Cement Products, 150 yd³/hr PCC plant in Ellensburg, WA.
- Mobilization takes 1 hour, demobilization takes 3 hours.
- PCC delivery trucks (you choose):
  - Fleet of 25 end-dump trucks with a 10 yd³ capacity each. Use the WSDOT Standard Specifications to determine whether or not you can use these trucks.
  - Fleet of 25 concrete mixing trucks with a 7.5 yd³ capacity each
- Base delivery trucks
  - Base delivery: trucks come from asphalt fleet, 12 yd³ capacity each
- Maximum paver speed = 1.8 ft/min while paving
- PCC curing time: based on HIPERPAV results with 50% reliability used (not 90%)
CSOL

Structural Design

Crack-and-Seat
- Mobilization takes 5 hours. This accounts for normal mobilization, the crack-and-seat operation and the application of the Petromat geotextile fabric.

Primary HMA Equipment
- Same as for the HMA remove-and-replace option.

Other Construction Information
- Same as for the HMA remove-and-replace option.