**THREE ALTERNATIVES**

**Alignment Alternative 1**
- Features: All ramps have a design speed of 65 mph or higher, right hand entrance and exit of Ramp D.
- Problems: Lower design speeds on ramps than Alternative 1, severe bridge skew angles.

**Alignment Alternative 2**
- Features: All ramps have a design speed of 60 mph or higher, right hand entrance and exit of Ramp D, Ramp B and D combined into a single exit.
- Problems: Left hand exit of ramp D from I-94 WB is a safety concern, Ramp A is extremely close to the right of way.

**Alignment Alternative 3**
- Features: Bridges are nearly perpendicular to the roads below, bridge span lengths are reduced, therefore reducing costs.
- Problems: Design speeds are as low as 40 mph on the ramps, extreme vertical grades would be necessary on ramp D.

**Analysis of Alternatives:**
- Alternative 1: Safety Hazard due to left hand exit
- Alternative 2: Meets design criteria
- Alternative 3: Design speeds too low

The rest of the design was based on alternative 2.

**DESIGN PROCESS:**
1. Horizontal Alignment
2. Three Alternative Alignments
3. Alignment 2 for Further Design
4. Superelevation
5. Storm Water Consideration
6. Vertical Alignment
7. Earthwork
8. Wetlands Impact
9. Cost Estimate
10. Final Recommendation

**Vertical Alignment Constraints:**
- Match Existing at Tie In Points
- Minimum Storm Water Elevations
- Bridge Underclearance Requirements

**Superelevation Example:** 169 EB Curve 2 PC

**Cost Estimate:**
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**Microstation and GeoPak:**

**Microsoft Excel:**

**Port Huron, MI**