

I-680 Reconstruction October 2011



I-680 Reconstruction

October 2011

The background image shows a large-scale infrastructure failure. A multi-lane concrete bridge has collapsed into a river, leaving large sections of the roadway submerged and broken. The surrounding landscape is flat and appears to be a rural or undeveloped area with some trees in the distance under a clear sky.

The Flood
The Facility
The Damage
Proposal
Design
Construction
Lessons Learned

I-680 Reconstruction

The Flood of 2011

March 4, 2011 Heavier than normal snowpack and late thaw.

April 6, 2011 - Runoff forecast at 136% of normal (2010 was 156%)

May 6, 2011 - 2011 predicted to be heaviest runoff season on 113 yr record.

May 23, 2011 - Up to 8 inches of rain falls in the upper reaches of Missouri River basin.
*****Flood Begins*****

May 24, 2011 - Little or no storage remains in the reservoir system. Garrison Dam releases 85,000 cfs (previous record was 65,000cfs)

I-680 Reconstruction

The Flood of 2011



**Iowa Department
of Transportation**

2011 Missouri River Flood

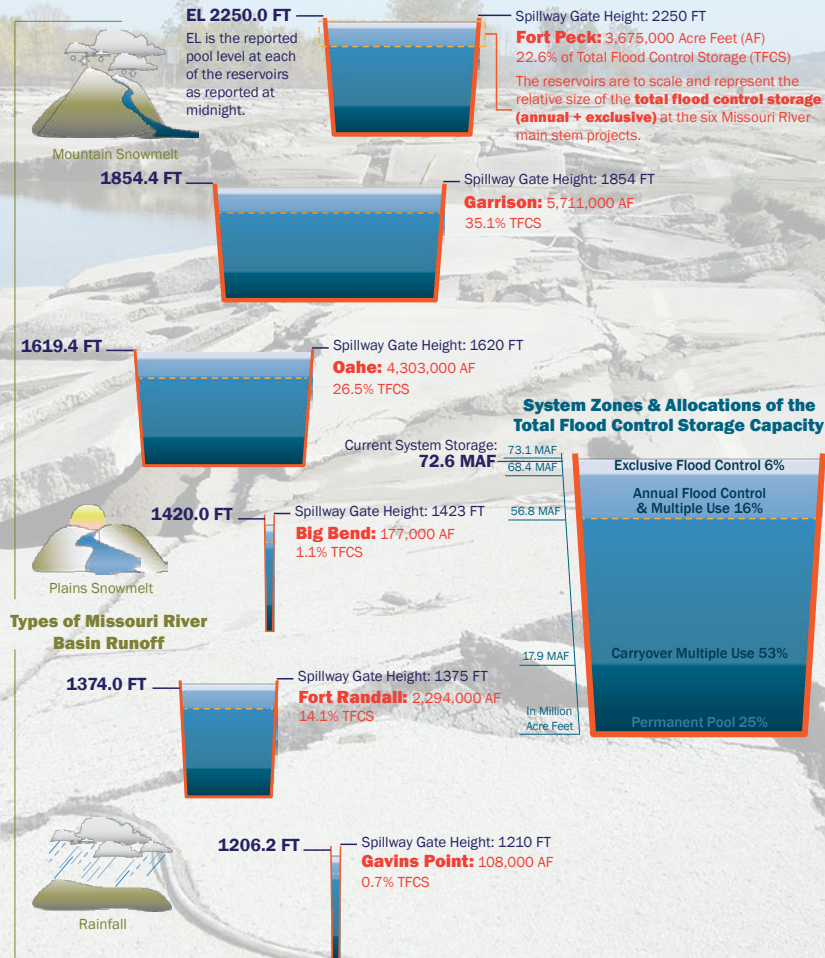


I-680 Reconstruction

The Flood of 2011

Missouri River Main Stem Reservoir System

Midnight Elevation (EL) Forecast: July 8, 2011 (feet above mean sea level)



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The Flood of 2011

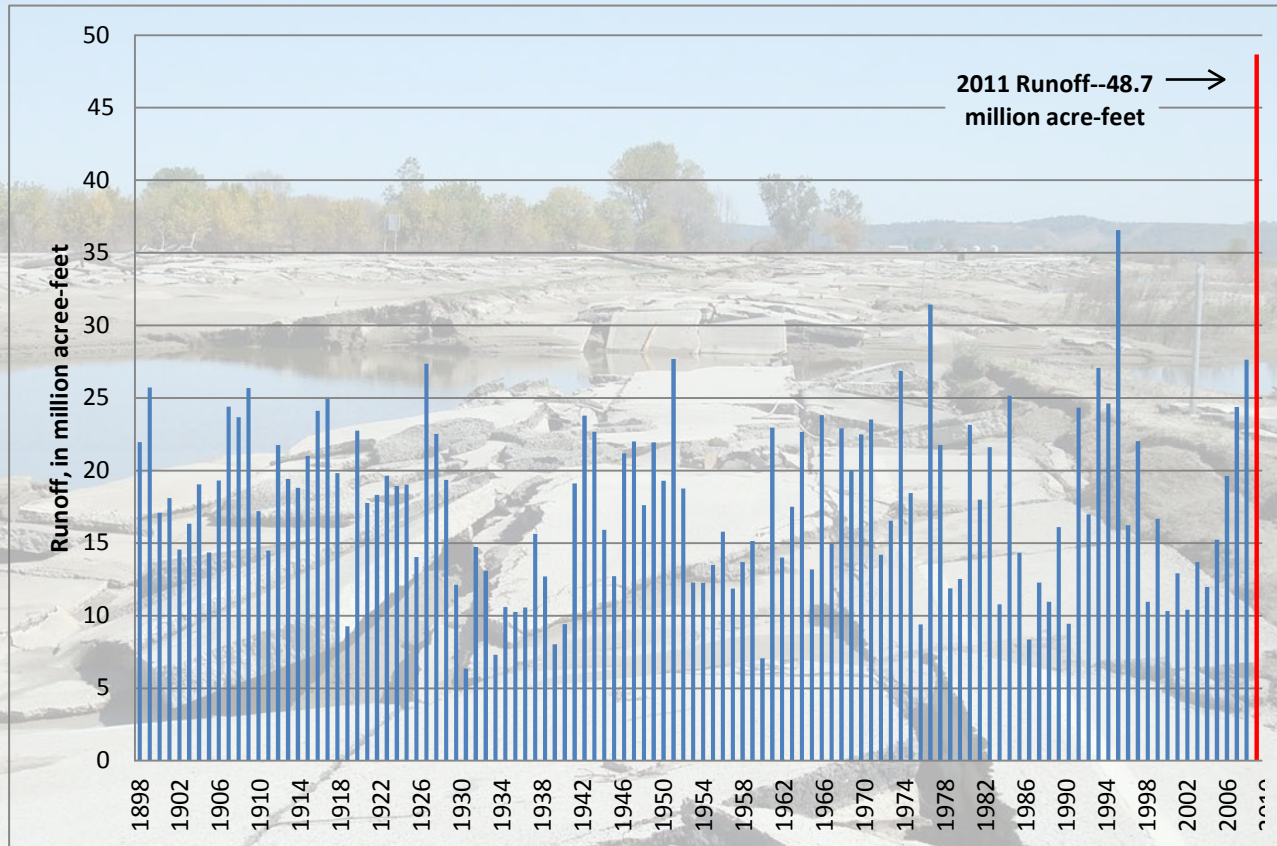


Figure 1. Annual March-July runoff, Missouri River basin, upstream of Sioux City, Iowa, 1898-2011

I-680 Reconstruction

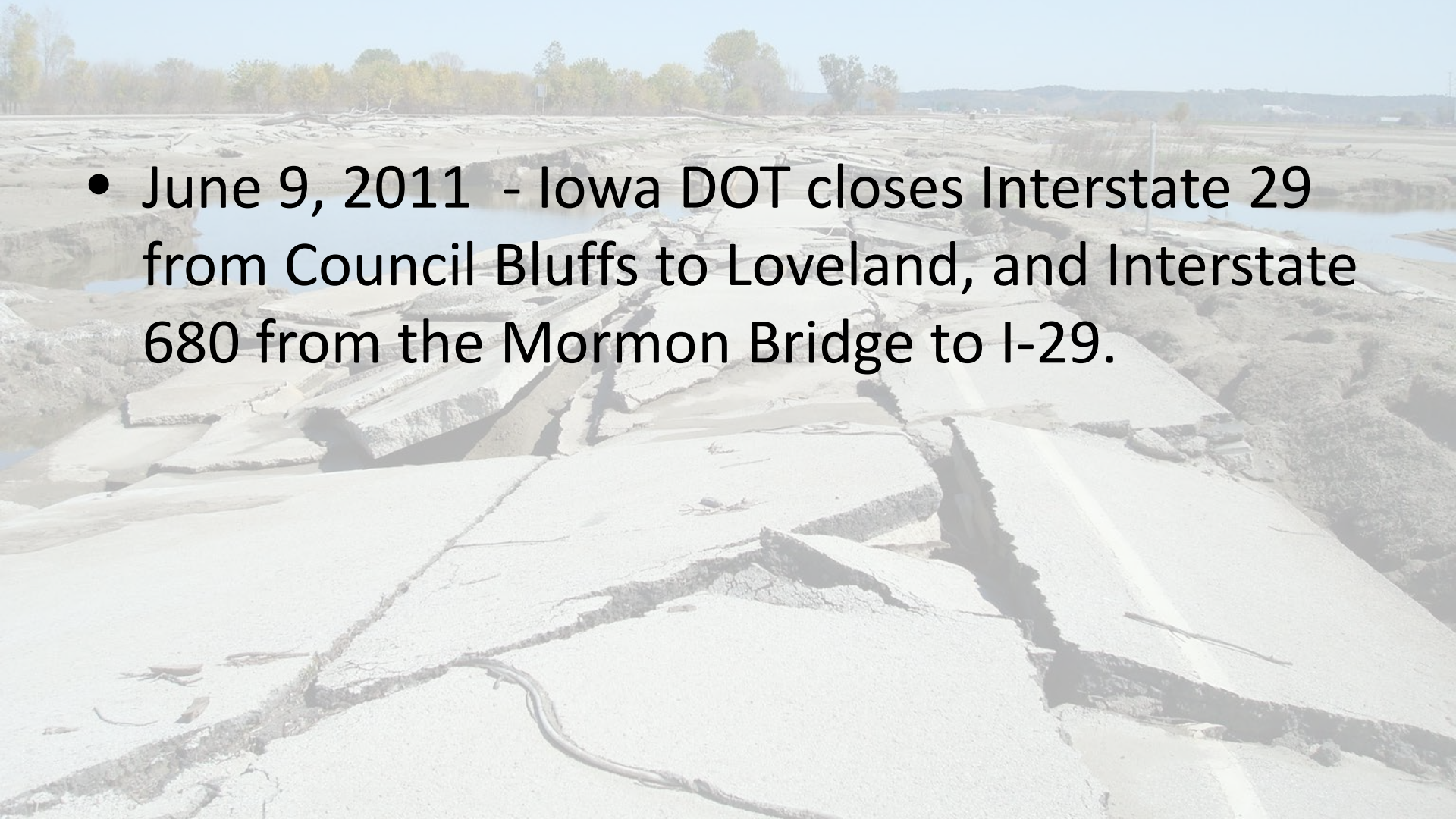
The Flood of 2011

- Importance of May 23, 2011
- FHWA Emergency Relief Manual
 - *Emergency repair work to restore essential traffic, minimize the extent of damage, or protect the remaining facilities, accomplished in the first 180 days after the occurrence of the disaster, may be reimbursed at 100 percent Federal share.*
- Clock starts ticking at the start of the event
May 23, 2011

I-680 Reconstruction

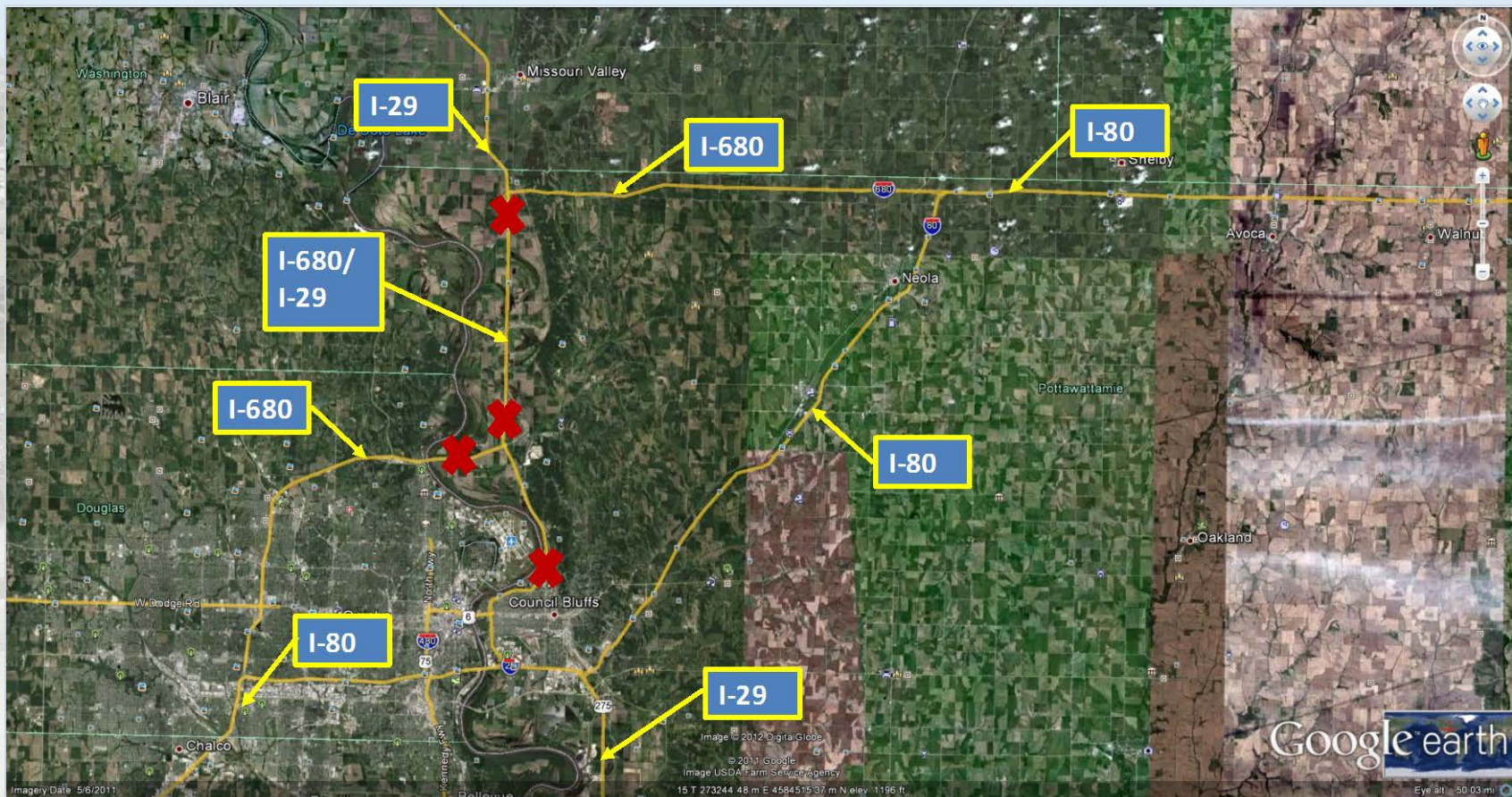
The Facility

- June 9, 2011 - Iowa DOT closes Interstate 29 from Council Bluffs to Loveland, and Interstate 680 from the Mormon Bridge to I-29.



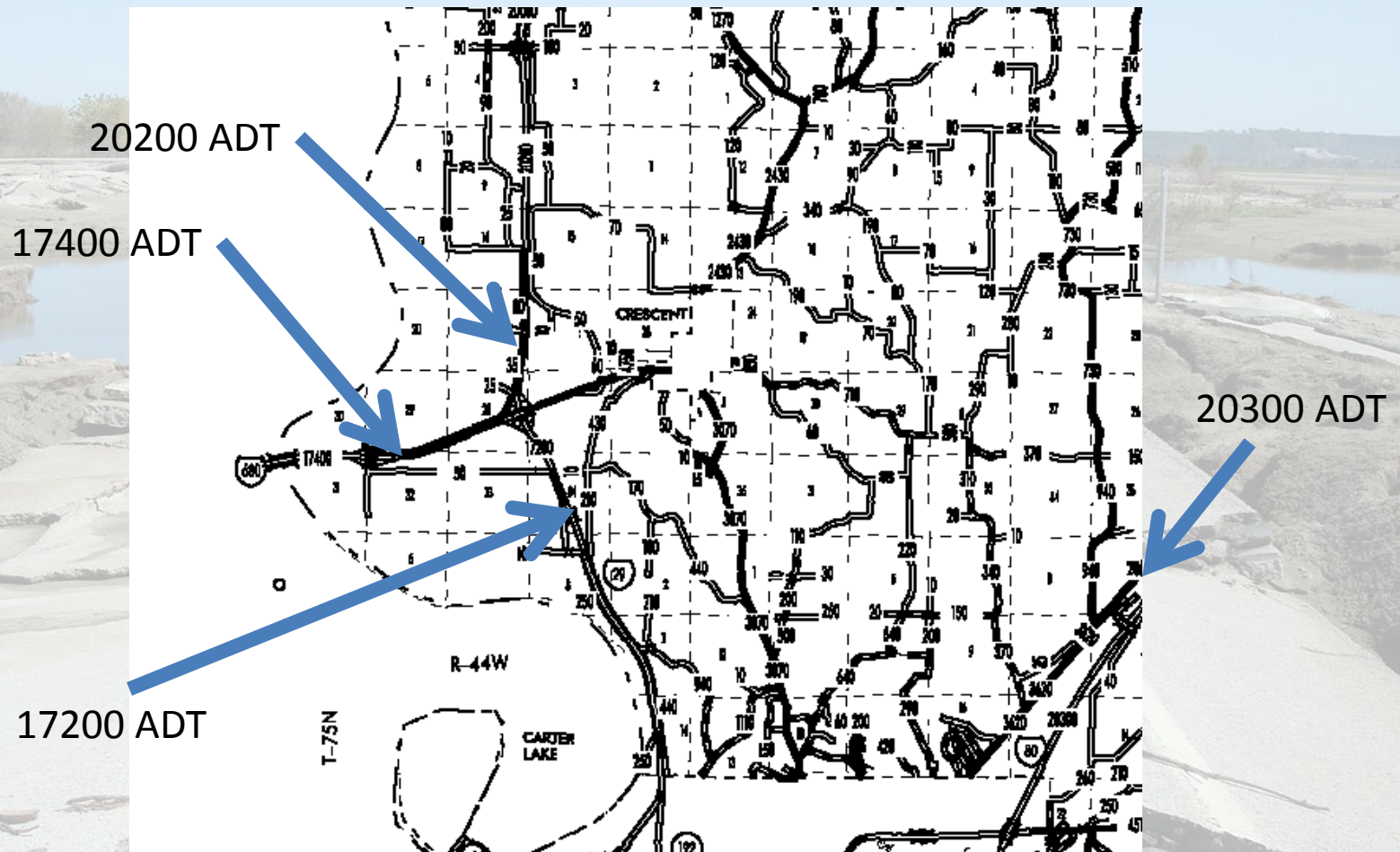
I-680 Reconstruction

The Facility



I-680 Reconstruction

The Facility



I-680 Reconstruction

The Facility



I-680 Reconstruction

The Facility



I-680 Reconstruction

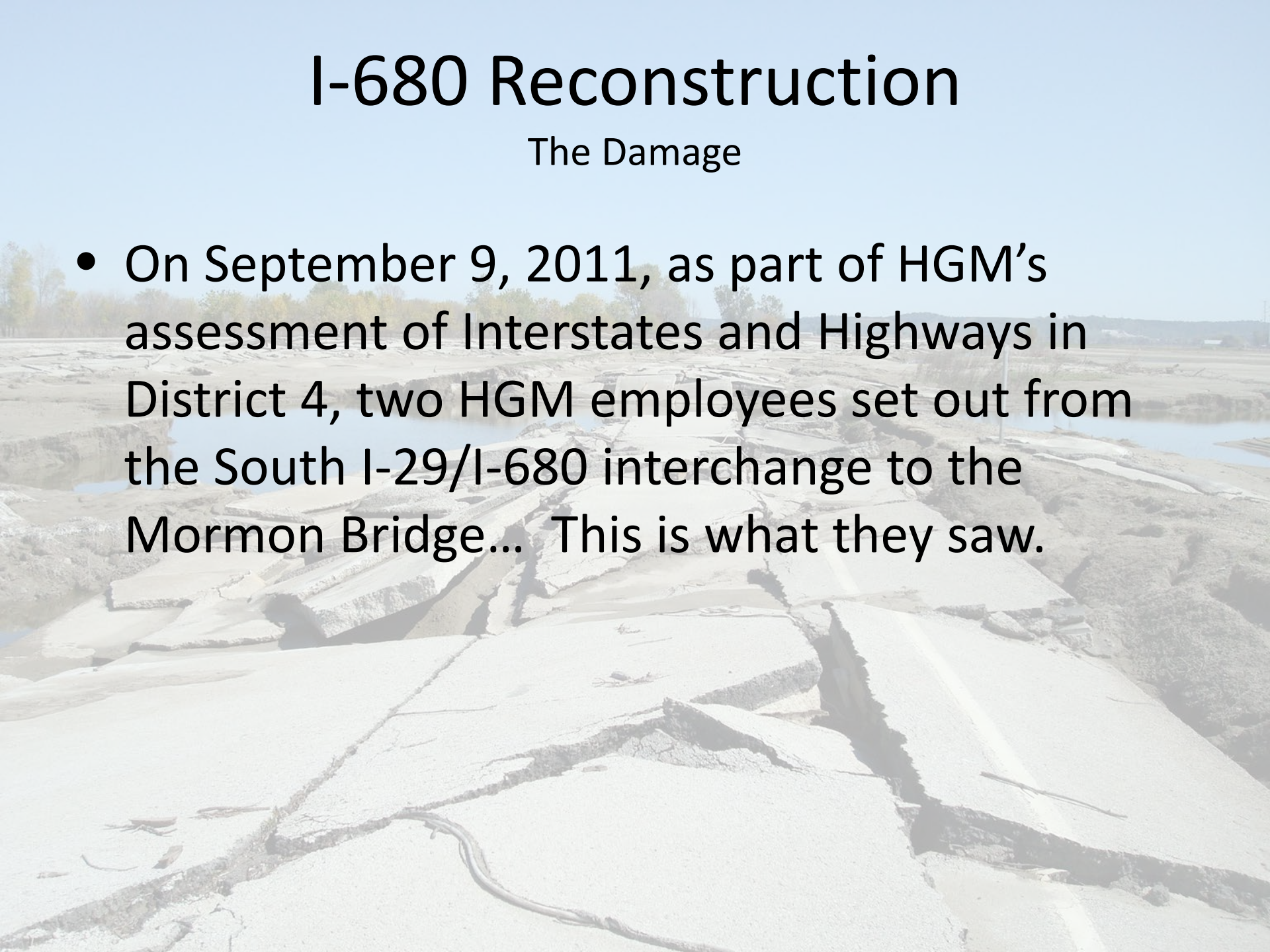
The Facility



I-680 Reconstruction

The Damage

- On September 9, 2011, as part of HGM's assessment of Interstates and Highways in District 4, two HGM employees set out from the South I-29/I-680 interchange to the Mormon Bridge... This is what they saw.



I-680 Reconstruction

The Damage



2011/09/09 14:01

I-680 Reconstruction

The Damage



2011/09/09 13:49

I-680 Reconstruction

The Damage



2011/09/09 13:34

I-680 Reconstruction

The Damage



2011/09/09 13:27

I-680 Reconstruction

The Damage



2011/09/09 13:26

I-680 Reconstruction

The Damage



2011/09/09 13:25

I-680 Reconstruction

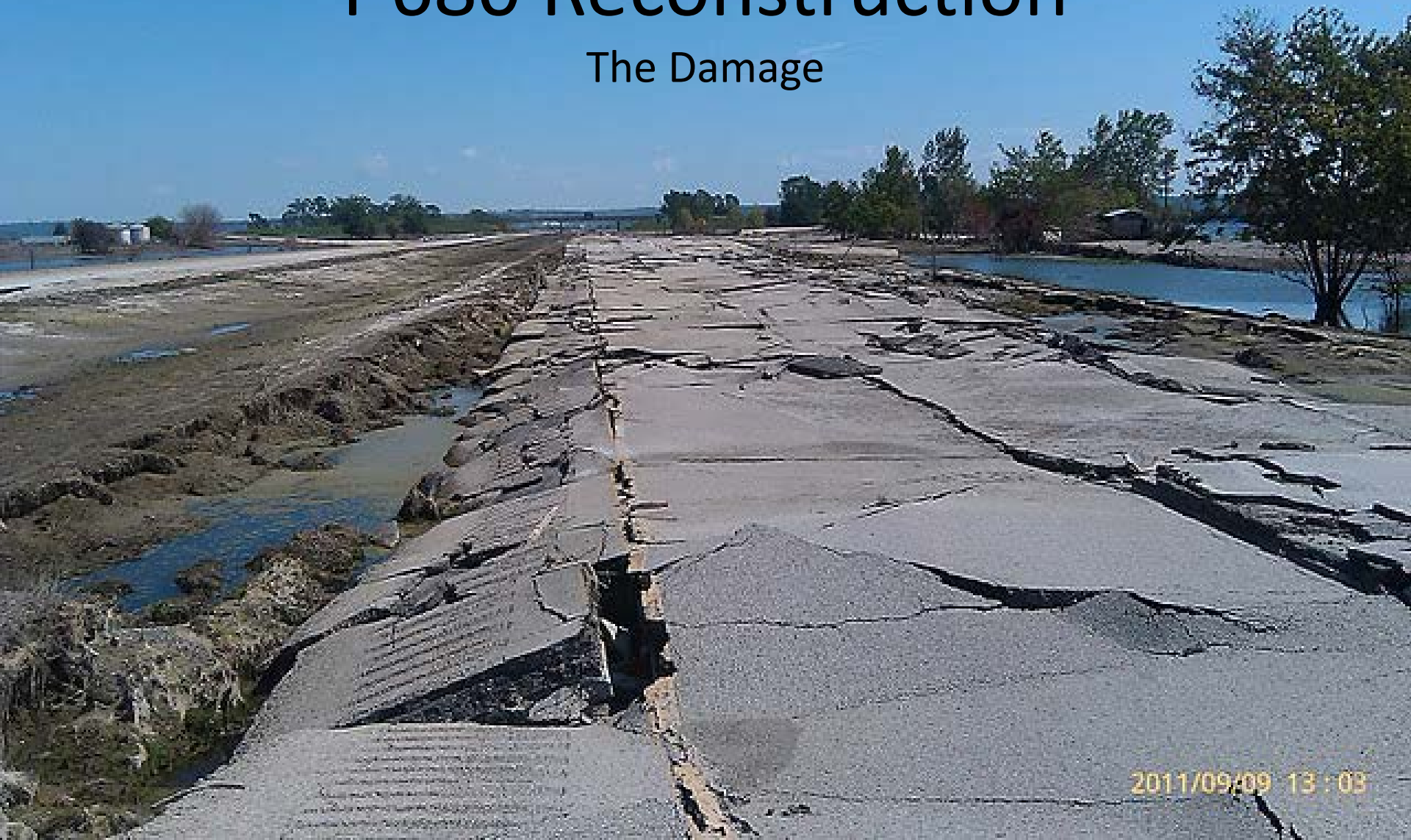
The Damage



2011/09/09 11 : 40

I-680 Reconstruction

The Damage



2011/09/09 13:03

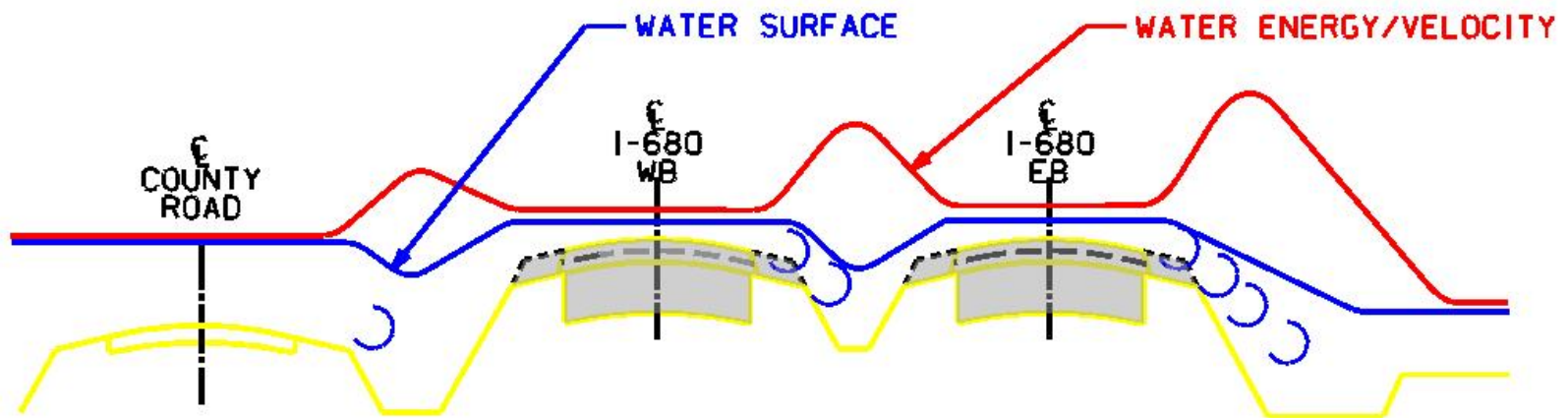
I-680 Reconstruction

The Damage



I-680 Reconstruction

The Damage



I-680 Reconstruction

Proposal

- Pre-Bid Held on September 14, 2011
 - Concerns about schedule
 - Concerns about aggregate availability
 - Concerns about paving temperatures
 - Concerns that the scope of work is too comprehensive
 - Concerns that the plans do not provide enough information pertaining to the existing 'flood damaged facility'
 - Concerns about subgrade
 - Concerns that alternative pavement section is unbalanced (HMA too thick)

I-680 Reconstruction

Proposal

- Iowa DOT made some revisions to the proposal
 - HMA pavement and subbase section modified
 - HMA Cold weather paving restrictions modified
 - < 3" Lift - Road Surface no less than 35°
 - > 3" Lift HMA Base – Road Surface no less than 25°
 - > 3" Lift WMA Base - Road Surface no less than 35°
 - PCC Cold weather paving restrictions modified
 - Air Temperature not restricted
 - PCC must maintain 35 ° F until opening strength using temperature probes every 1000'
 - Limits of construction modified

I-680 Reconstruction

Proposal

Total Project Length 3.42 miles

- 2.63 Miles of Mainline I-680 Reconstruction
- 0.79 Miles of Interchange Ramp Reconstruction

Project Quantities (Approximate)

- 368,000 CY Cut 23,000 CY Fill
- 140,900 TON Special Backfill
- 46,100 CY Modified Subbase
- 95,400 SY 11" PCC Pavement
- 46,500 SY 7" PCC Shoulders

I-680 Reconstruction

Proposal

Closed Since Early June

Nontraditional Design and Construction to Expedite
Project Completion

- Bid as a Minimum Design Contract
- Single Lump Sum Contract Awarded

ESTIMATED PROJECT QUANTITIES (1 DIVISION PROJECT)					
Item No.	Item Code	Item	Unit	Total	As Built Qty.
1	2599-9999010	I-680 RECONSTRUCTION	LS	1	

100-1A
07-15-97

I-680 Reconstruction

Proposal

Contract Requirements:

- Goal: Restore Traffic to I-680 as Rapidly as Possible
- All Design & Const. Work Necessary to Rebuild I-680 (111+00 to 250+00)
- All Pavement Must be Replaced
- NPDES Permit
- Two Lane, Two Way Traffic by December 23rd, 2011

Work to be Added by Change Order:

- Signing
- Guardrail

I-680 Reconstruction

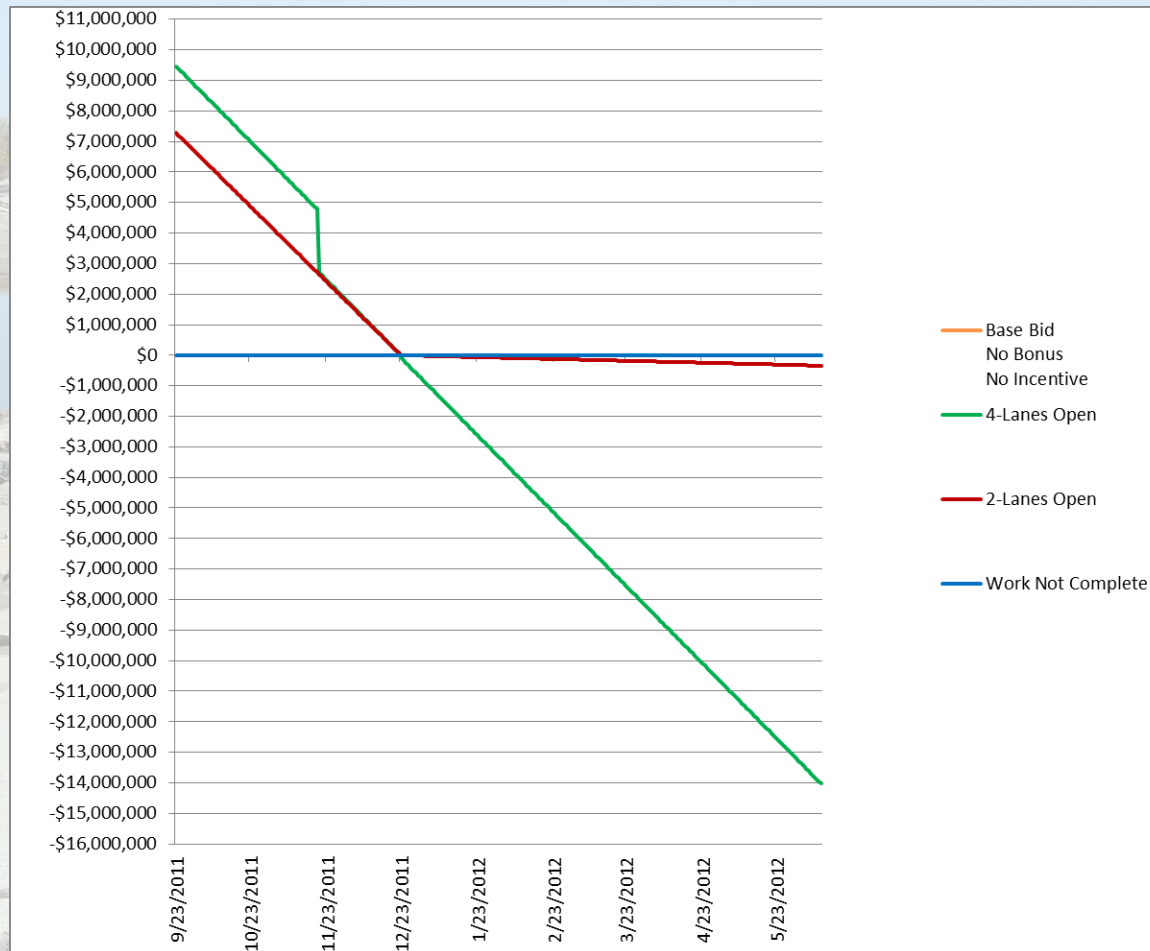
Proposal

Incentive / Disincentive:

- \$80,000 per Calendar Day Bonus
- Opening I-680 to Two Lane, Two Way Traffic by December 23rd
- \$2,000 per Calendar Day Additional Bonus
- Opening all Four Lanes of Traffic by December 23rd
- \$2,000,000 “No Excuses” Bonus
- Entire Project Completed by November 20th
- \$82,000 per Calendar Day Disincentive
- Not having Two Lane, Two Way Traffic after December 23rd
- \$2,000 per Calendar Day Disincentive
- All Four Lanes Not Open to Traffic after December 23rd
- \$1,000 Per Calendar Day Liquidated Damages
- Any Work Not Completed by June 1st 2012

I-680 Reconstruction

Proposal



Incentive/Disincentive/Bonus

I-680 Reconstruction

Proposal

- Contractor to develop engineering drawings
- Contractor to secure NPDES permit with 30 days of award
- Work to be added by Contract Modification
 - Signing
 - Guardrail
- Work not included
 - Permanent Lighting (added later by Cont. Mod.)
 - Fencing
 - Permanent Erosion Control
 - Backslope Repair (south ditch added by Cont. Mod.)

I-680 Reconstruction

Proposal

- Letting Held on September 23, 2011
- Project Awarded to Peterson Contractors Inc. /Reilly Construction Joint Proposal

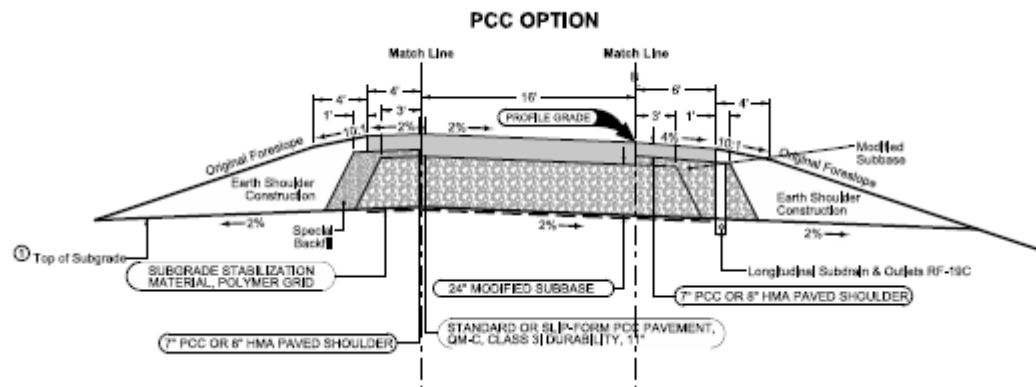
Contractor	Bid
– PCI/Reilly	\$ 19,239,000
– C.J. Moyna & Sons, Inc.	\$ 19,480,000
– Chester Bross Const. Co.	\$ 20,892,000
– Cedar Valley Corp	\$ 21,927,950
– Kiewit Infrastructure Co.	\$ 33,104,000

I-680 Reconstruction

Proposal

- The Construction Team
 - Peterson Contractors Inc.
 - Reilly Construction Co.
 - Manatt's Inc.
 - Dormark Construction Co.
 - Iowa Plains Signing, Inc.
 - Next Phase Environmental, Inc.
 - Snyder & Associates, Inc.
 - Antigo Construction Co.
 - Henriksen Contracting LLC.
 - Midwest Fence – Guardrail Systems, Inc.
 - Baker Electric

Typical Section:



I-680 Reconstruction

Design

- 3 sets of record drawings were used to develop the existing conditions (197 sheets)
 - 1976 = Grade and Pave $\frac{1}{2}$ of the Corridor
 - 1977 = Grade and Pave remaining $\frac{1}{2}$
 - 1996 = ACC Overlay (100mm WB / 150mm EB)
- Final record drawings produced included one set (195 sheets)

I-680 Reconstruction

Project Timeline:

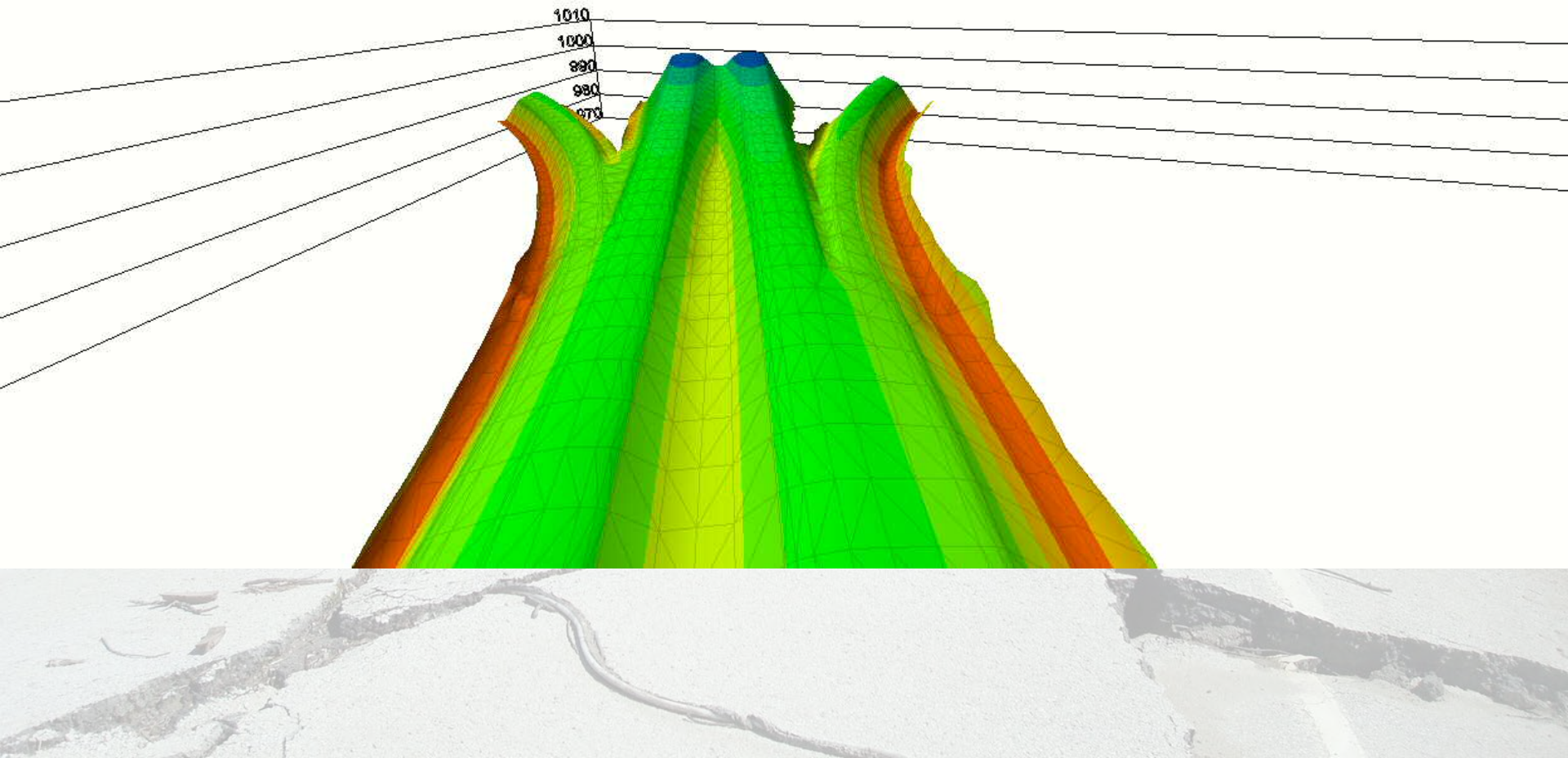
Design

- Pre-Bid Meeting
 - Began Design
 - Bid Letting (NPDES #2 Publication)
 - Mobilization Into Site
 - Pre-Construction Meeting
 - Begin Pavement Removals
 - Mainline Subgrade 3D Models
 - Subgrade Prep Complete (WB I-680)
 - I-29 Ramp Geometry & 3D Models
 - Special Backfill Placement (WB I-680)
 - 3D Models Complete (I-680 ML & I-29 Ramps)
 - I-680 WB Pavement Staking
 - 3D Models Complete (Local Road Ramps)
 - Begin Paving (I-680 WB)
 - All 3D Modeling Complete (Incl. Ditches)
 - I-680 WB Paving Complete (Incl. Ramps)
 - I-680 EB Paving Complete (Incl. Ramps)
 - All Paving Completed (Incl. Shoulders)
 - Ditch Grading Completed
 - Subdrain Completed
 - Open to Traffic
- September 14th
September 15th
September 23rd
September 24th – 25th
September 26th
September 27th
September 30th
October 3rd
October 4th
October 5th
October 5th
October 7th
October 10th
October 13th
October 13th
October 19th
October 25th
October 28th
October 31st
November 1st
November 2nd

I-680 Reconstruction

Design

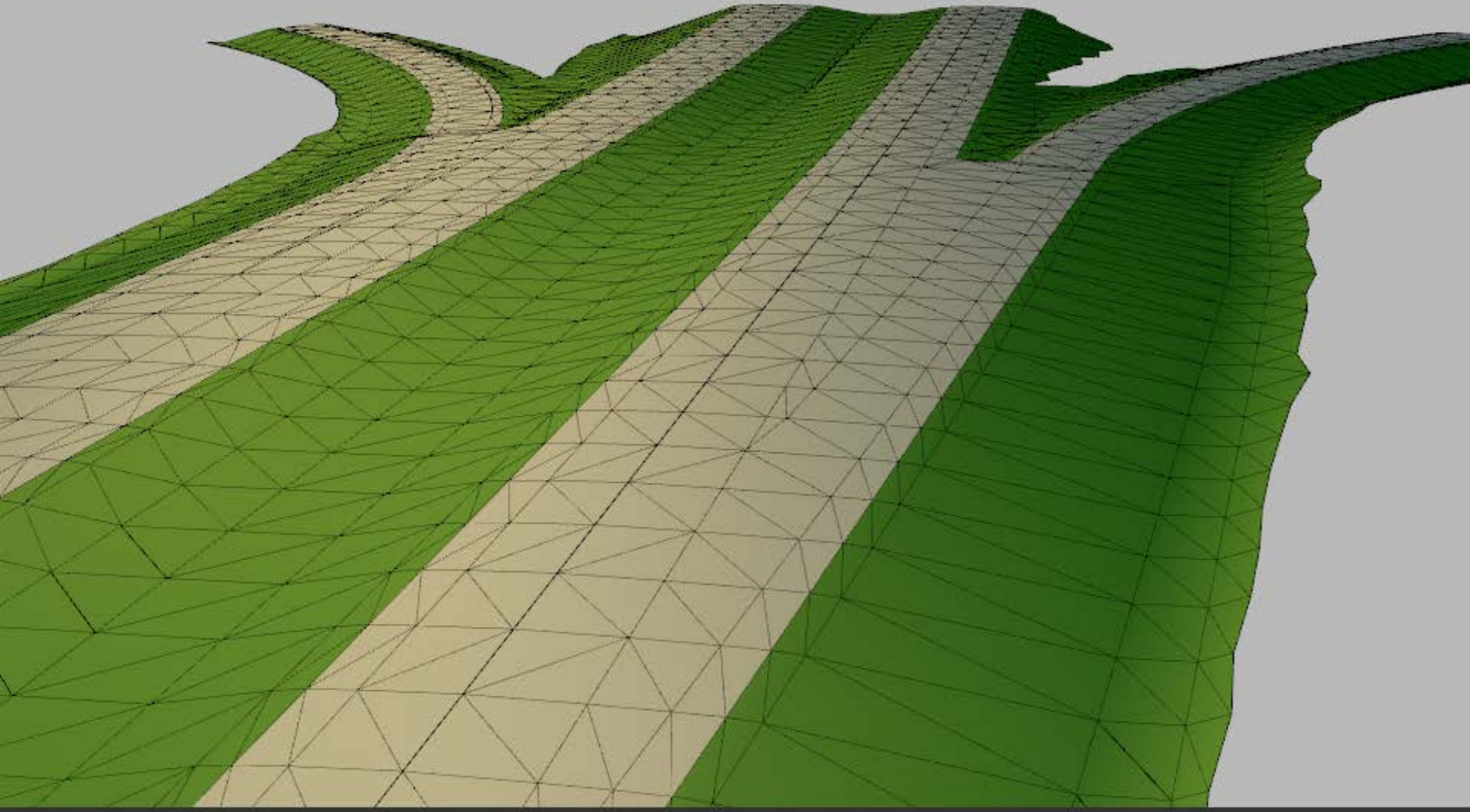
Screen Shot of Terramodel Showing I-29 Ramps B & C



I-680 Reconstruction

Design

Screen Shot of 3D Model



I-680 Reconstruction

Construction

- The Contract Administration Team
 - Iowa DOT
 - George Feazell – District 4 Construction Engineer
 - Daniel Redmond – District 4 Materials Engineer
 - Bruce Flippin – Council Bluffs Resident Construction Engineer
 - HGM Associates – Provided On-Site Construction Services
 - » 18 staff assigned to monitor daily construction activities, record and verify quantities, provide daily feedback to DOT, and on-site liaison between the contractor and DOT
 - Thiele Geotech – Provided On-Site Materials Testing
 - » 1 on-site staff several office staff provide on-site monitoring of soil, aggregates and PCC

I-680 Reconstruction

Construction

- Mobilization (Slowly) starts on September 24, 2011
- Pre-Con Held in Ames, IA on September 26, 2011 at 1:00 PM
- Utilities marked on September 27, 2011 at 11:00 AM
- Pavement removal begins on September 27, 2011 at 6:30 PM... Work proceeds 24/7

I-680 Reconstruction

Construction

- 24 hour operations end on October 8, 2011 at 2:00 AM
- October 9, 2011 – Operations continue using 14 to 16 hour days, 7 days a week
- October 13, 2011 – Mainline paving begins at 5:30 AM



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



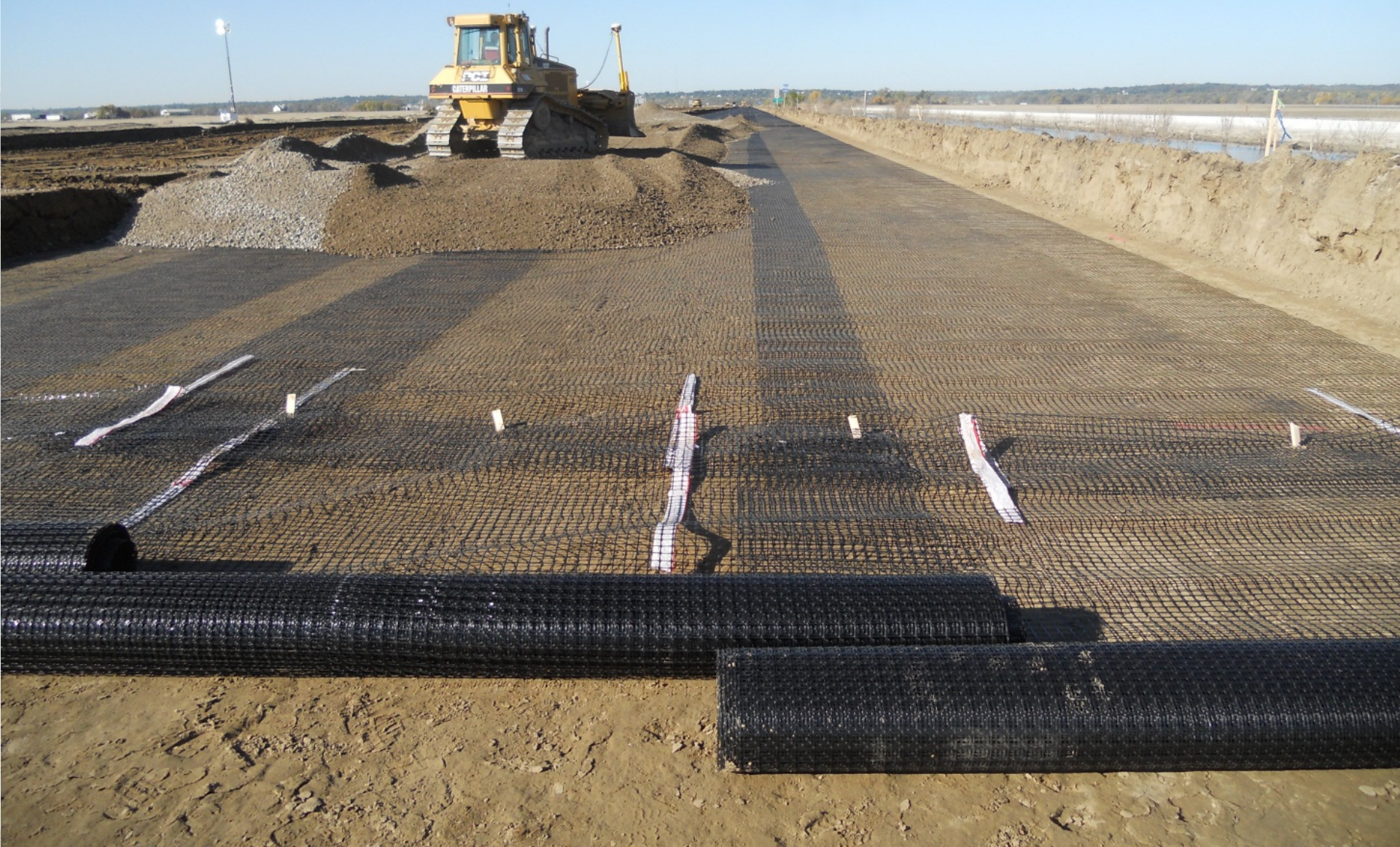
I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



Manatts Batch Plant in
operation 10-13-11 (10:30 am)

I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction

October 3rd – EB



I-680 Reconstruction

Construction

October 3rd – WB



I-680 Reconstruction

Construction

October 10th – EB



I-680 Reconstruction

Construction

October 10th – WB



I-680 Reconstruction

Construction

October 17th – EB



I-680 Reconstruction

Construction

October 17th – WB



I-680 Reconstruction

Construction

October 24th – EB



I-680 Reconstruction

Construction

October 24th – WB



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction



I-680 Reconstruction

Construction

- On October 30, 2011, 35 days after the first piece of equipment was placed on site, the Iowa DOT acknowledged the I-680 roadway was complete, as defined by the original proposal documents. Work was complete from outside shoulder to outside shoulder.

I-680 Reconstruction

Construction

Due to minor work that required lane closures and additional extenuating circumstances, the road was opened on November 2, 2011 following a dedication ceremony held at the Crescent, Iowa Fire Station.



I-680 Reconstruction

Construction

- After over a month of unseasonably warm, dry weather, the dedication was held inside due to rain, sleet and snow.



I-680 Reconstruction

Lessons Learned

- How did they do it?



I-680 Reconstruction

Lessons Learned

- Haul Road and Equipment Maintenance



I-680 Reconstruction

Lessons Learned



I-680 Reconstruction

Lessons Learned

- Coordination



I-680 Reconstruction

Lessons Learned



I-680 Reconstruction

Lessons Learned

- Equipment



I-680 Reconstruction

Lessons Learned



I-680 Reconstruction

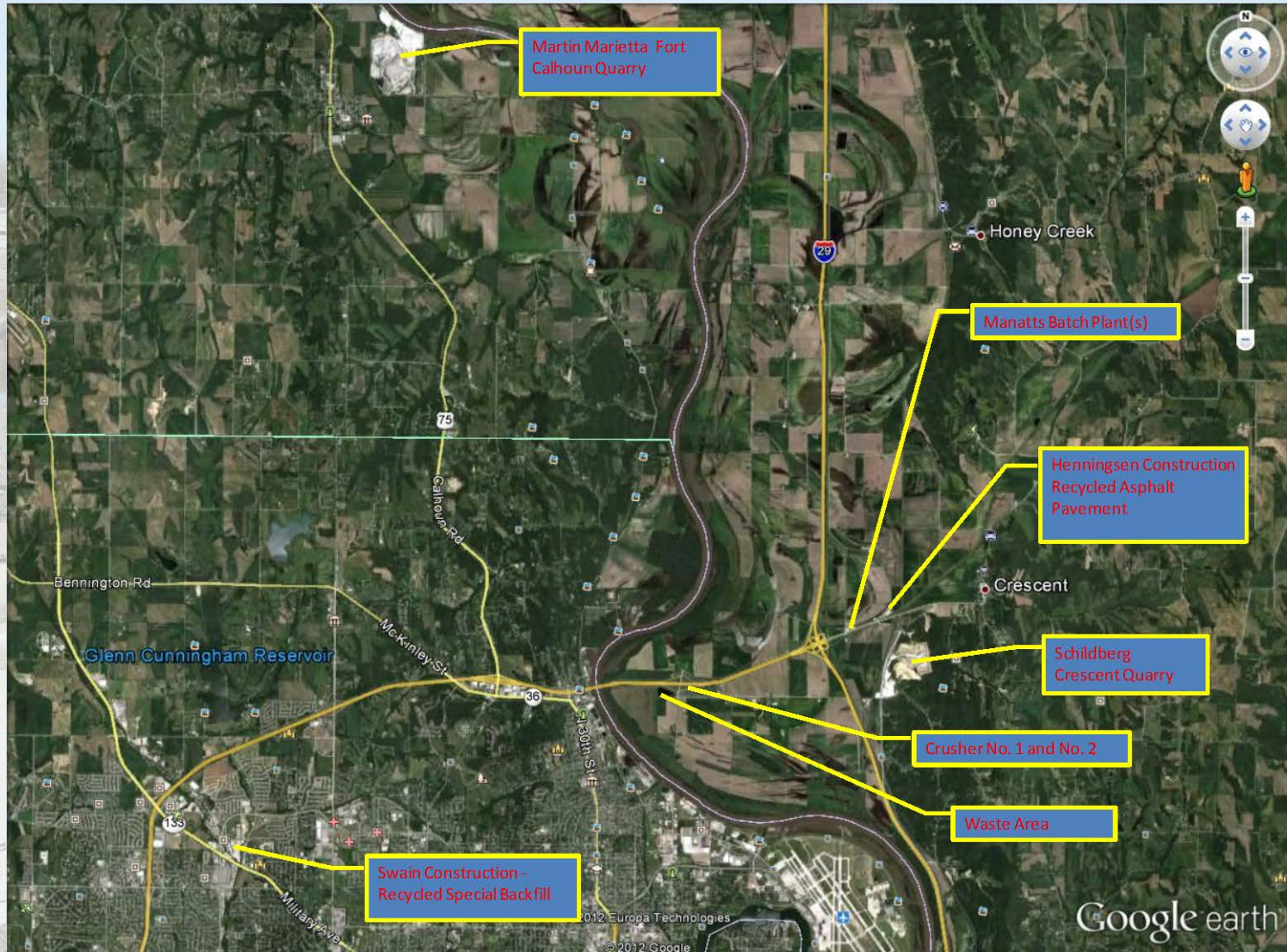
Lessons Learned

- Other Factors
 - No Traffic
 - Wide Median (64' to 82')
 - Straight Forward Design
 - 0% Grade
 - 2 Curves
 - 6 Ramps w/ Tapers
 - Two Crushers – On-Site
 - Batch Plant – ¼ Mile from site with easy access
 - Several close sources of aggregate
 - 4 Sources
 - Adjacent Waste Site
 - Few Utilities
 - Partnering
 - Contractor – Contractor
 - Owner – Contractor
 - Weather, weather, weather!



I-680 Reconstruction

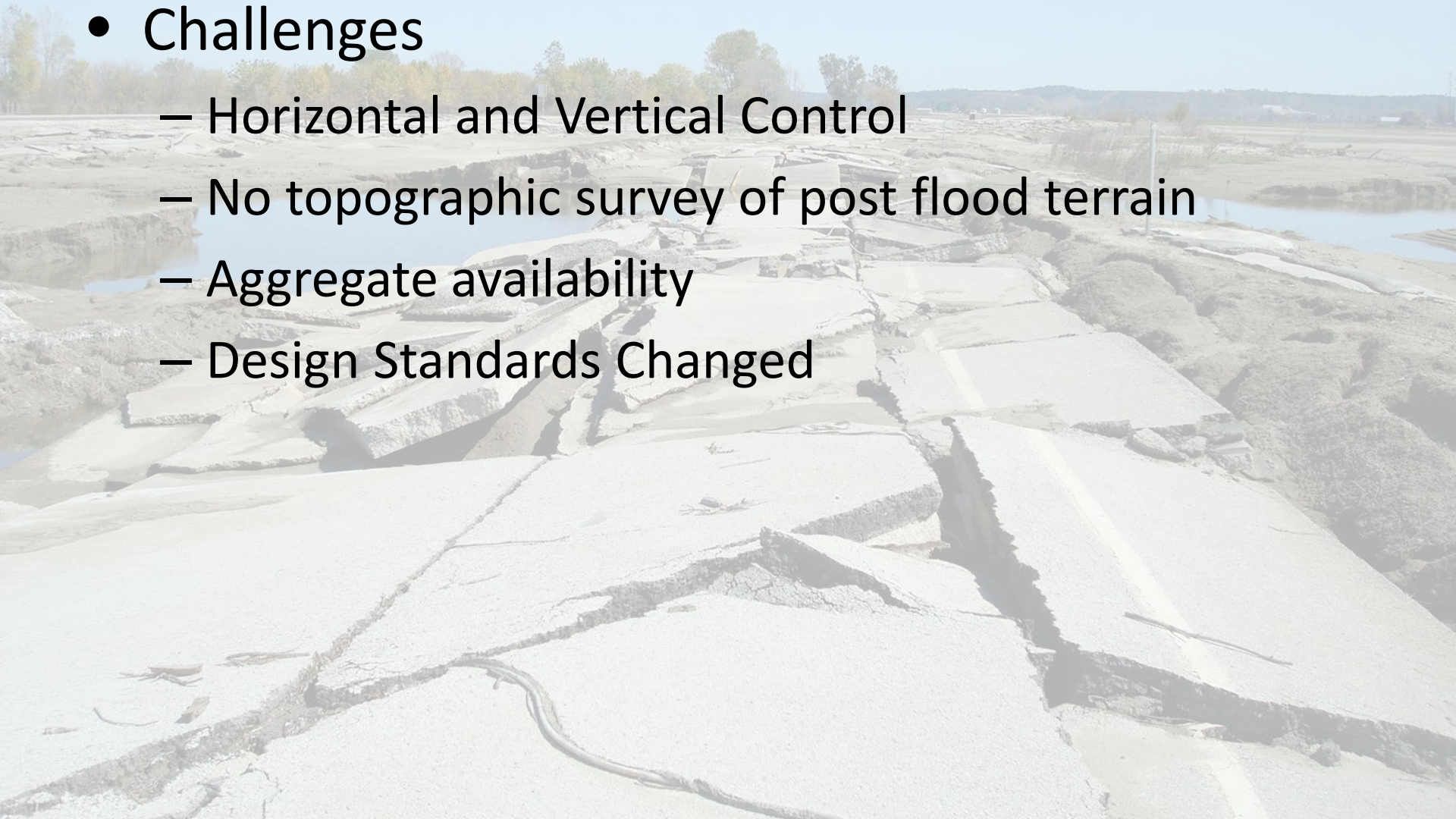
Lessons Learned



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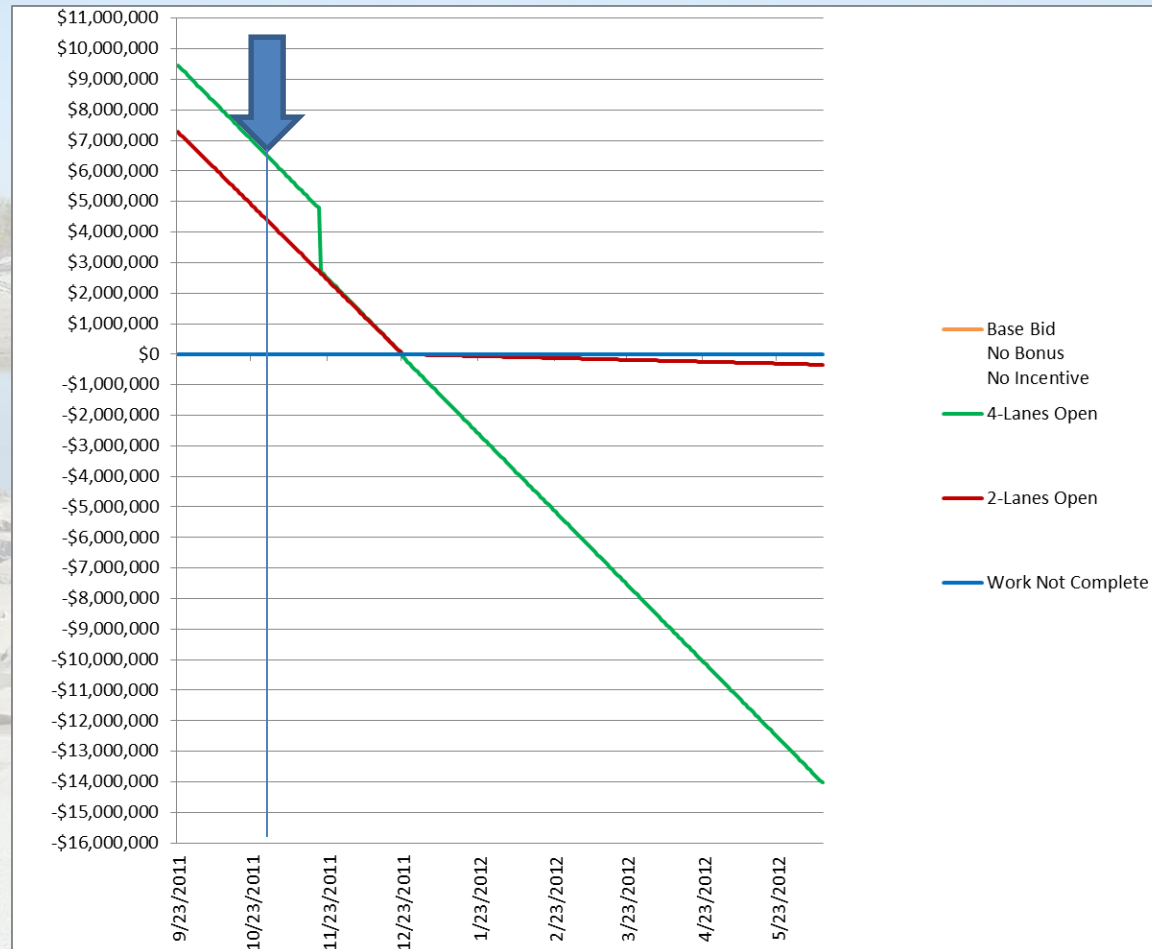
Lessons Learned

- Challenges
 - Horizontal and Vertical Control
 - No topographic survey of post flood terrain
 - Aggregate availability
 - Design Standards Changed



I-680 Reconstruction

Completion



Incentive/Disincentive/Bonus
(Risk vs. Reward)

I-680 Reconstruction

Completion

- 4-Lanes Open on October 31, 2011,
54 Days of Incentive = \$ 4,428,000
- 4-lanes open by 11/20/2011 = \$ 2,000,000
- Base Bid w/out Incentive = \$ 13,923,879.10
- Total = \$ 20,351,879.10

I-680 Reconstruction

Awards

- 2012 Roads & Bridges
 - Top 10 Roadway Project in U.S.
- 2012 American Transportation Award
 - Top 10 Road Project in U.S.
- 2013 American Council of Engineering Companies of Iowa
 - Grand Place Award (1st in Category)

I-680 Reconstruction

Your presenters:

George Feazell, Iowa Department of Transportation – District 4
Wade Greiman, Snyder & Associates, Inc.
Brian Higginbotham, HGM Associates Inc.

