

Emergency Levee Construction

48th Street and Fox Island

A Lesson of Time and Logistics

Sherwin Wanner, PE
Houston Engineering, Inc



Statistics of the Project Area

- 4.53 Miles of Levee
 - 9,425 LF Sand Trap Bags
 - 7,000 Cy Sand
 - 14,481 LF of Clay Levee
 - 68,250 CY Clay (in place)

Preparation Timeline

Announcement of Releases
“Need to Prepare For”

USGS Reported Readings
in Bismarck

Are we there?

May 24 – 80,000 cfs

May 23 – 75,000 cfs

May 20 – 60,000 cfs

May 16 - 50,000 cfs

Less than 3 Days

Less than 3 Days

4 Days

4 Days

May 27 – 83,100 cfs 15.77 ft

May 26 – 76,300 cfs 15.02 ft

May 24 – 60,400 cfs 14.48 ft

May 20 – 50,100 cfs 13.37 ft

May 16 – 48,100 cfs 12.78 ft

Preparation Timeline

Announcement of Releases “Need to Prepare For”

Starting May 31 Incremental
Increase to 150,000 cfs by
June 17

May 28 – 150,000 cfs

May 26 – 120,000 cfs

May 25 - 85,000 cfs

USGS Reported Readings in Bismarck

July 1 – 145,000 cfs 19.23 ft

June 18 – 151,000 cfs 18.72 ft

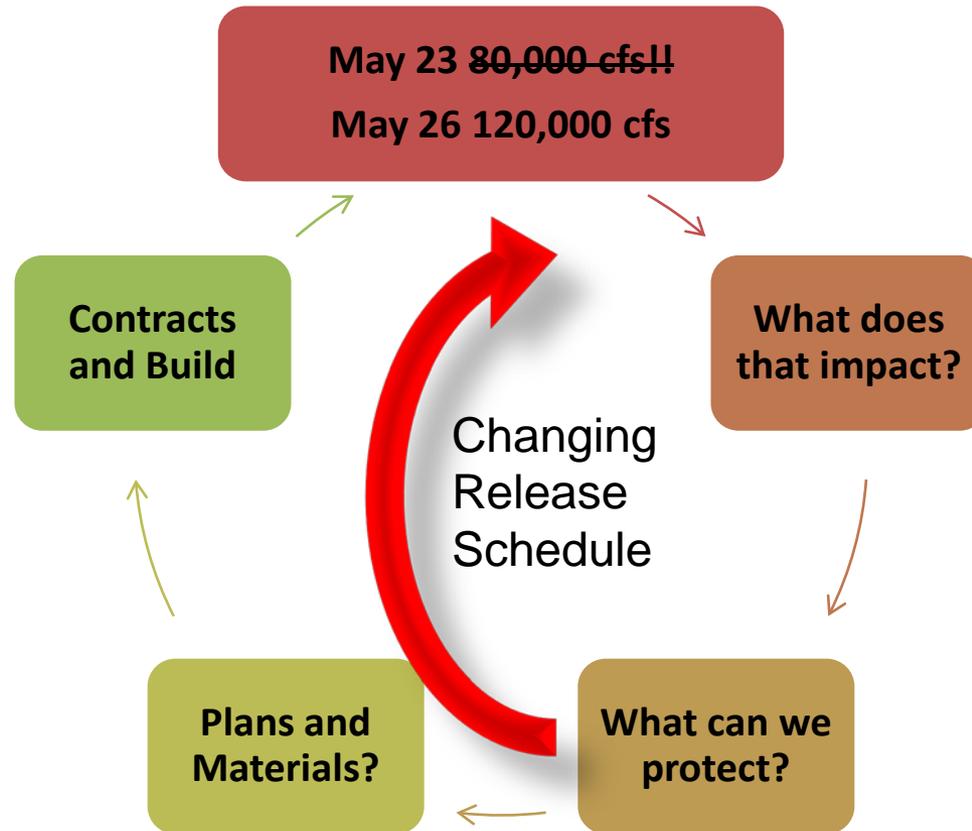
June 3 – 108,000 cfs 16.92 ft

May 31 – 86,600 cfs 15.86 ft

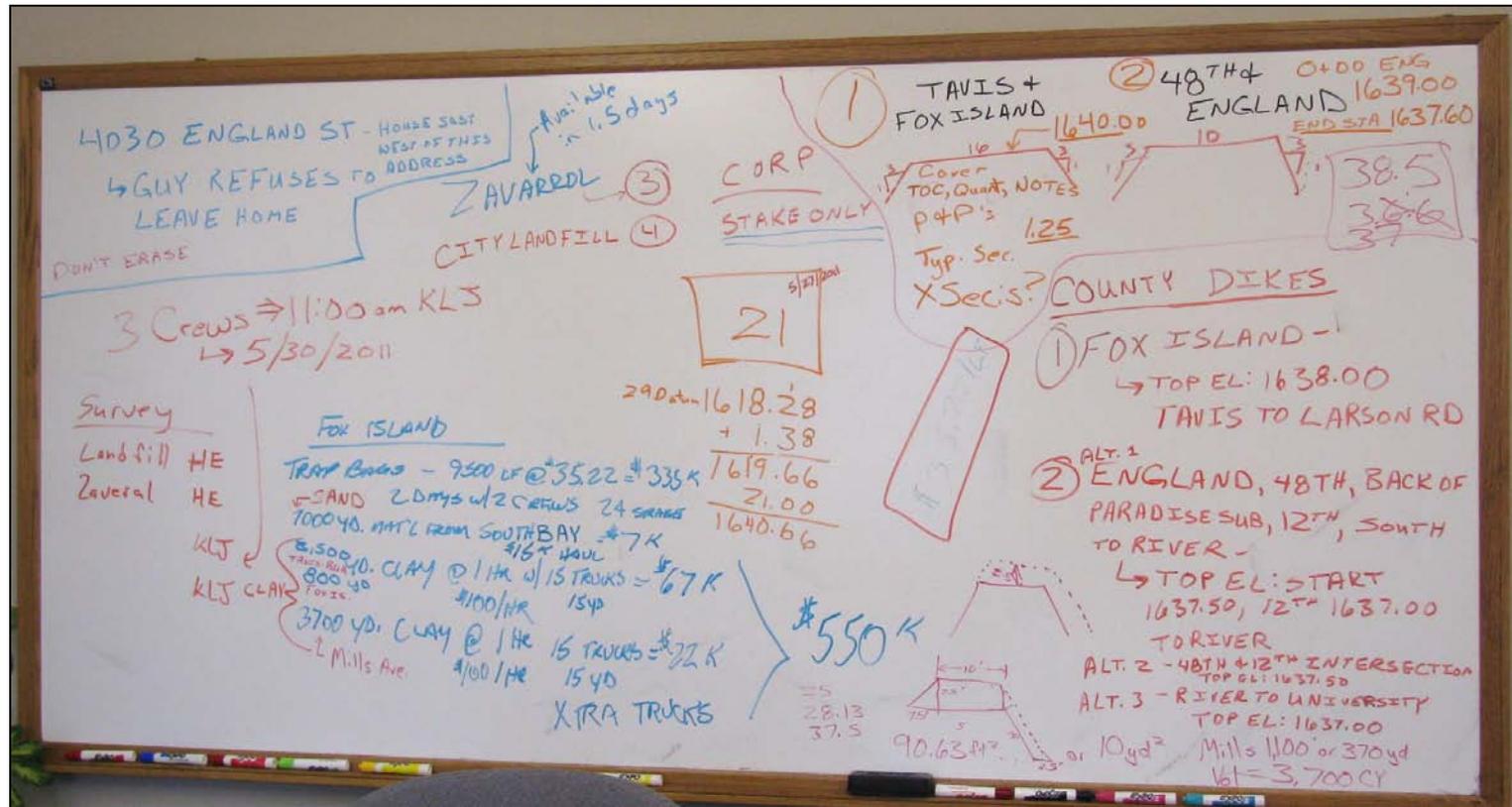
May 29 – 83,600 cfs 15.77 ft

4.5 days
React for 21
days to
150,000 cfs
Less than 6 Days

Planning



Planning



“If we are a go than our chance of Success is 100%” Casey Einrem

No More Time for Planning?!

“Do or do not..” Yoda

We are looking at 120,000 cfs plus
Its May 26 and we have until June 1!

**Must be
Hauling
Clay on
27th**

**Assuming 24 hour
Construction with
No Hiccups**

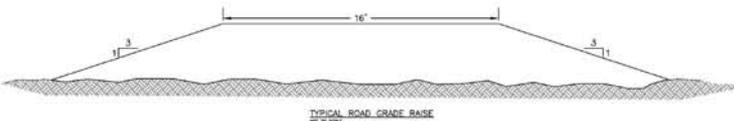
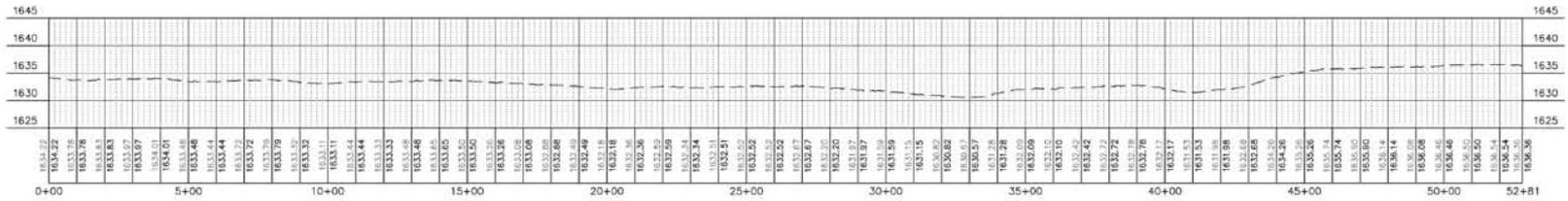
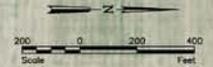
**Mission
Success
June 1**



Plan Moving Forward



Plan



This document is preliminary and not for construction or implementation purposes.

PRELIMINARY

T:\002-000 Burleigh County Water Revenues District\002-000 Burleigh Co. WPD 2011 Flood Right\04day_Dr_P&P.dwg 11/17/2011 4:33 PM (pfrich)

| No. | Revision | Date | By |
|-----|----------|------|----|
| | | | |



Bismarck
 P: 701.323.0200
 F: 701.323.0300

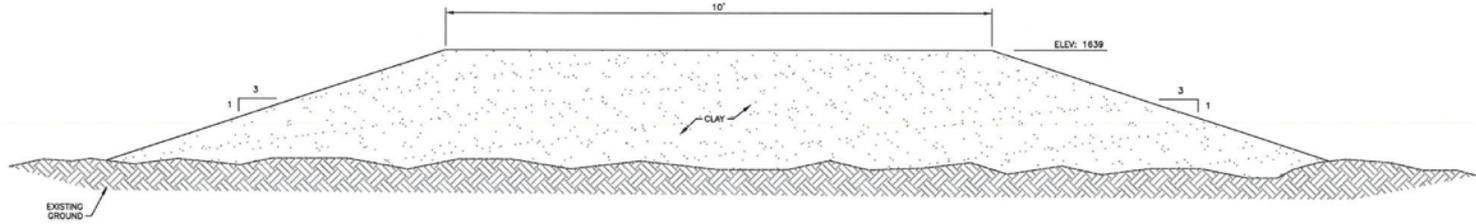
Drawn by CAD Date 6-20-11
 Checked by ENG Scale AS SHOWN

SIBLEY DRIVE GRADE RAISE
 BURLEIGH COUNTY HIGHWAY DEPARTMENT
 BURLEIGH COUNTY, ND

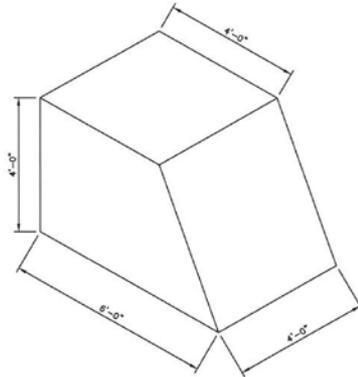
SHEET TITLE 1
 SHEET TITLE 2
 PROJECT NO. XXXX-XXX

SHEET 1 of 1

Plan



TYPICAL BERM SECTION
NOT TO SCALE



TYPICAL TRAP BAG
NOT TO SCALE



T:\2008-000-Burleigh County Highway Dept\2011\2008-007-Sub A - Fox Island\2011\10 TYPICAL SECTIONS.dwg - TYPICAL SECTIONS.dwg - 1/12/2011 2:14 PM - CJE

| No. | Revision | Date | By |
|-----|----------|------|----|
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| | | | |
|-----------------|-----------------|----------|---------|
| Bismarck | | Drawn by | Date |
| P: 701.323.0200 | F: 701.323.0300 | TKP | 5-27-11 |
| Checked by | | Scale | |
| CJE | | NONE | |

TAVIS ROAD & FOX ISLAND PROTECTION BERM
BURLEIGH COUNTY HIGHWAY DEPARTMENT
BURLEIGH COUNTY, NORTH DAKOTA

TYPICAL SECTIONS
PROJECT NO. 6296-007

SHEET
10 of 10

Plan

48TH AVE & ENGLAND ST PROTECTION BERM

BURLEIGH COUNTY, NORTH DAKOTA
MAY, 2011

GOVERNING SPECIFICATIONS:

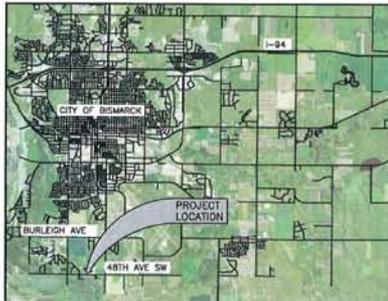
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, ADOPTED BY THE NORTH DAKOTA DEPARTMENT OF TRANSPORTATION, OCTOBER 2008 SHALL APPLY TO ALL STANDARD DRAWINGS CURRENTLY IN EFFECT AND OTHER CONTRACT PROVISIONS SUBMITTED HEREIN.

GOVERNING STANDARDS:

MANUAL FOR UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION. THIS SPECIFICATION INCLUDES THE SHAPES, COLORS, AND FONTS USED IN ROAD MARKINGS AND SIGNS. ALL TRAFFIC CONTROL DEVICES MUST CONFORM TO THESE STANDARDS.

UTILITY NOTE:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION, AS-BUILT MAPS AS PROVIDED BY MUNICIPALITIES OR UTILITY COMPANIES, AND/OR EXISTING DRAWINGS. THERE IS NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN INDICATE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. NOR IS THERE A GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES. HE AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MAY RESULT FROM HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UTILITIES.



VICINITY MAP

SHEET INDEX

1. COVER SHEET, VICINITY, AND LOCATION MAPS
2. TABLE OF CONTENTS, QUANTITIES, AND GENERAL NOTES
- 3.-5. PLAN & PROFILES
6. TYPICAL SECTIONS

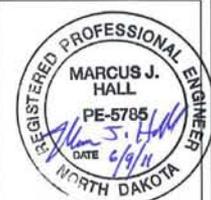


LOCATION MAP

APPROVAL OF COUNTY ENGINEER

I, MARCUS HALL, A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT I HAVE REVIEWED THESE PLANS FOR GENERAL CONSISTENCY WITH ESTABLISHED POLICIES AND REQUIREMENTS FOR 48TH AVENUE AND ENGLAND STREET PROTECTION BERM, BURLEIGH COUNTY, NORTH DAKOTA, AS SHOWN ON THE ACCOMPANYING PLANS.

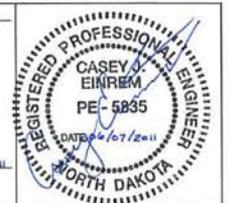
Marcus J. Hall DATE: 6/9/11
 MARCUS HALL, PE
 REGISTERED PROFESSIONAL ENGINEER
 NORTH DAKOTA REGISTRATION NO. 5785



ENGINEER'S CERTIFICATE

I, CASEY J. ENREM, A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF NORTH DAKOTA, HEREBY CERTIFY THAT THE 48TH AVENUE AND ENGLAND STREET PROTECTION BERM, BURLEIGH COUNTY, NORTH DAKOTA WERE PREPARED UNDER MY SUPERVISION AND ARE COMPLETE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

Casey J. Enrem DATE: 06/07/2011
 CASEY J. ENREM, PE
 REGISTERED PROFESSIONAL ENGINEER
 NORTH DAKOTA REGISTRATION NO. 5835



Here We Go!

Bid

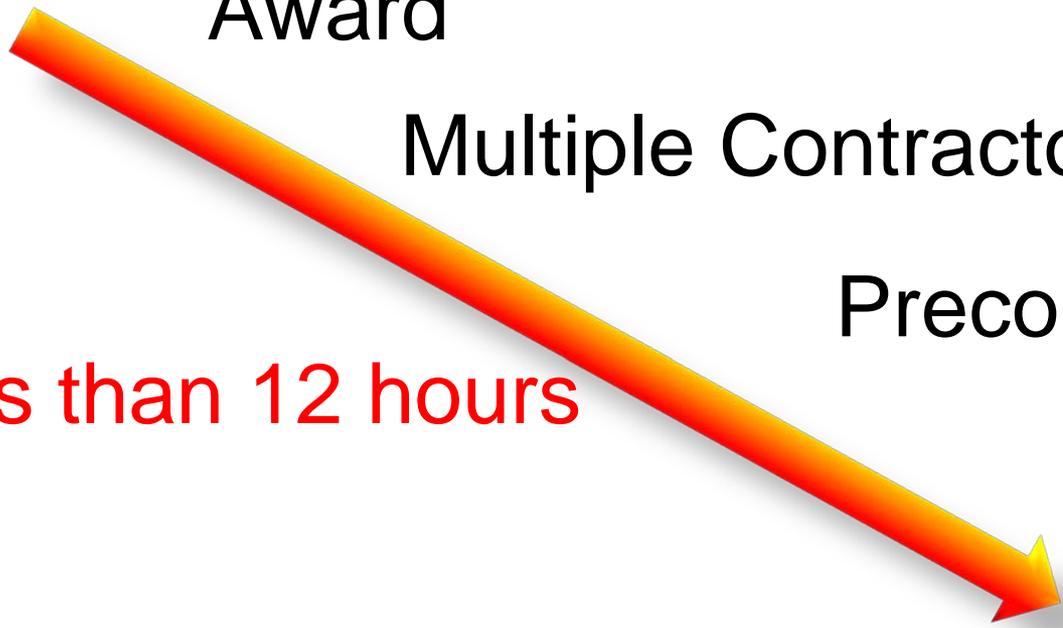
Award

Multiple Contractor Coordination

Precon

Proceed

Less than 12 hours



No Hiccups to Success?

- ✓ Trees can be cleared in time
- ✓ Sand trap bag commitment is realized
- ✓ Commitments on # of trucks is realized
- ✓ No delays in obtaining Borrow material
- ✓ Operations can run 24 hours (no weather)
- ✓ No restriction on haul routes

Planning (Praying) for Some Good Luck

Execution of Plan

| TAVIS ROAD+FOX ISLAND | Status | Survey | Issues | Staffing | Night |
|--|--------|-----------|---------------|-----------------------|---------|
| A. Mills - 3,700CY Elev. 1640.00 | | 5/30/11 | Critical Link | Casey Dave Michael | |
| I.R. Sand Trap - Far West | | | | | |
| B+C. Smokey Lane - 800CY Elev. 1625 | | | | | |
| I.B. Sand Trap - #4 | | | | | |
| D. Tavis South on England - 2500CY To NW Corner of Southby Elev. 1639.50 | | | | | |
| Zavarol Survey Support | | As needed | | Airhard | Steve L |
| Land Fill | | As needed | | Steve Strick | Aaron |
| 48 th England | | As needed | | Sherwin | |
| SC WTP | | | | Mike | Allan |

Matt - EOC
 Kevin - NAWS
 Jennifer - Everything in office
 Nic - Grades
 Craig - Support Michael
 Travis - NAWS
 Tyler
 Kyle

24 Hour Operations = Work / Rest Cycle
 Dedicated People = Forced Sleep

Trees Removed---No Hiccup



**Before: 80ft wide
corridor ½ mile Long**



**After: Trees cut down and Dike
protection built**

NDARNG

Will take 15 hours

“Yea Right No Way?”

Mission Complete
(15 hours later)

“Oh my God! This is
Awesome”

HOORAH!

Sand Trap Bags - Hiccup?



Started Slow

**Corners Taking
Forever**

Heat Tips Broke

Sand Trap Bags - Hiccup Avoided



Engineer Finds Tips Locally

Square Corners

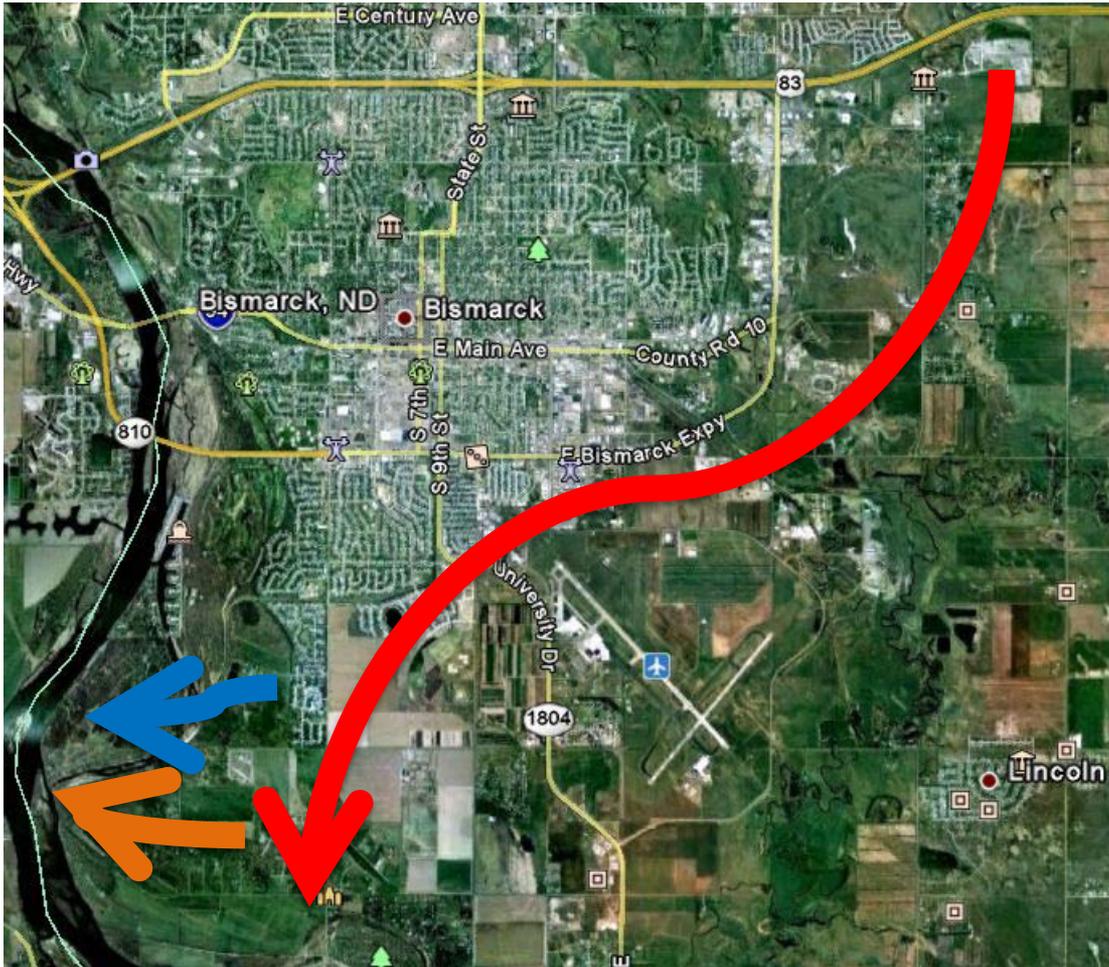
NDANG Takes Over

**NDANG Average Production
181 ft/hour w/ Burleigh County**
(Company record was 140 ft/hour)

**Sand Traps Bags Completed on
Time**

NDANG Crew Flew!

Trucks Moving Dirt - Load after Load



**62 Trucks/hour Hauling
10 miles one way to 48th**

**21 Trucks/hour Hauling
Couple miles one way to
Fox Island area**

**County (#?) trucks hauling
sand to Fox Island area**

**Traffic Routes Adjusted
as Levee is constructed**

Planning



Landfill Borrow—“Digging Like Moles on Speed”



**Not the only Project using
Landfill Borrow**

**At one point 6 excavators
operating**

**Truck Traffic also working
around Active Landfill
Operations**

**Landfill Staff Instrumental
In Maintain Access and
Roadways**

Borrow and Hauling Operation – No Hiccups



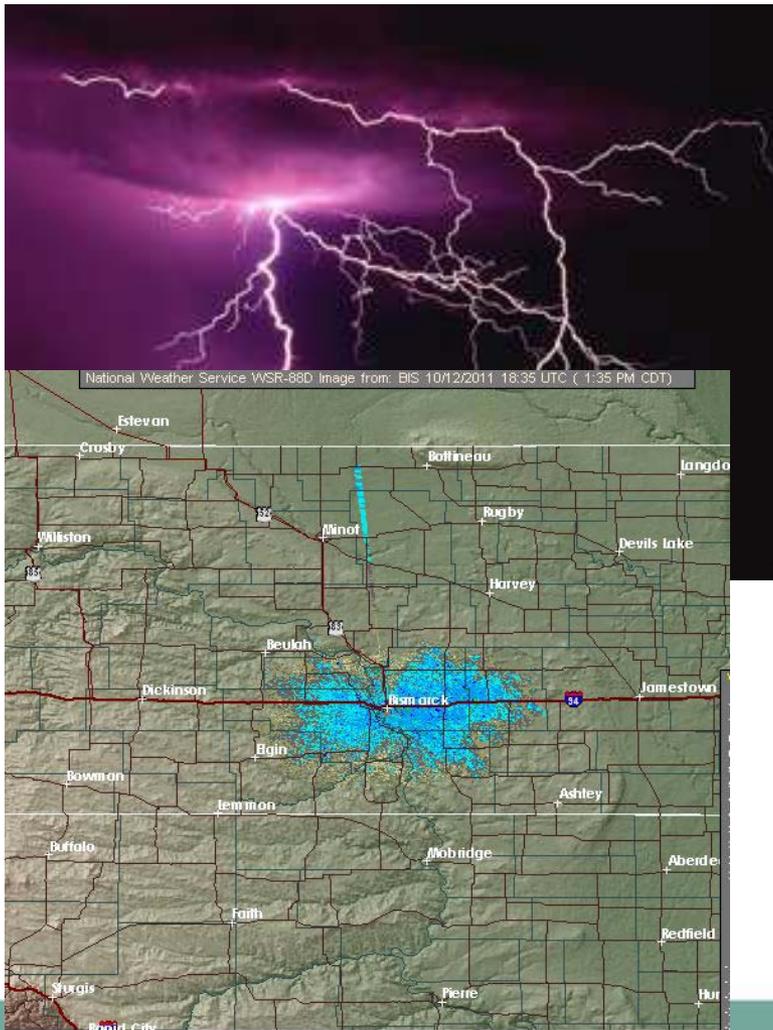
Contractors Committed Resources

Borrow was attainable

Routes were given priority for trucks

Congestion at Levee site was controlled

Weather – We got Lucky! Minimal Hiccup



Thunderstorm threatened on the 29th?

Operations were shut down for Couple of Hours

Major part of Storm passed To the South

Pulling truck off dike early saved Surface

Hilltop Borrow area was held as a secondary site

48th Avenue



Last Minute Plastic and Sandbags



65,000 sandbags

5 HEMTT's every 40 minutes

9 hours to complete

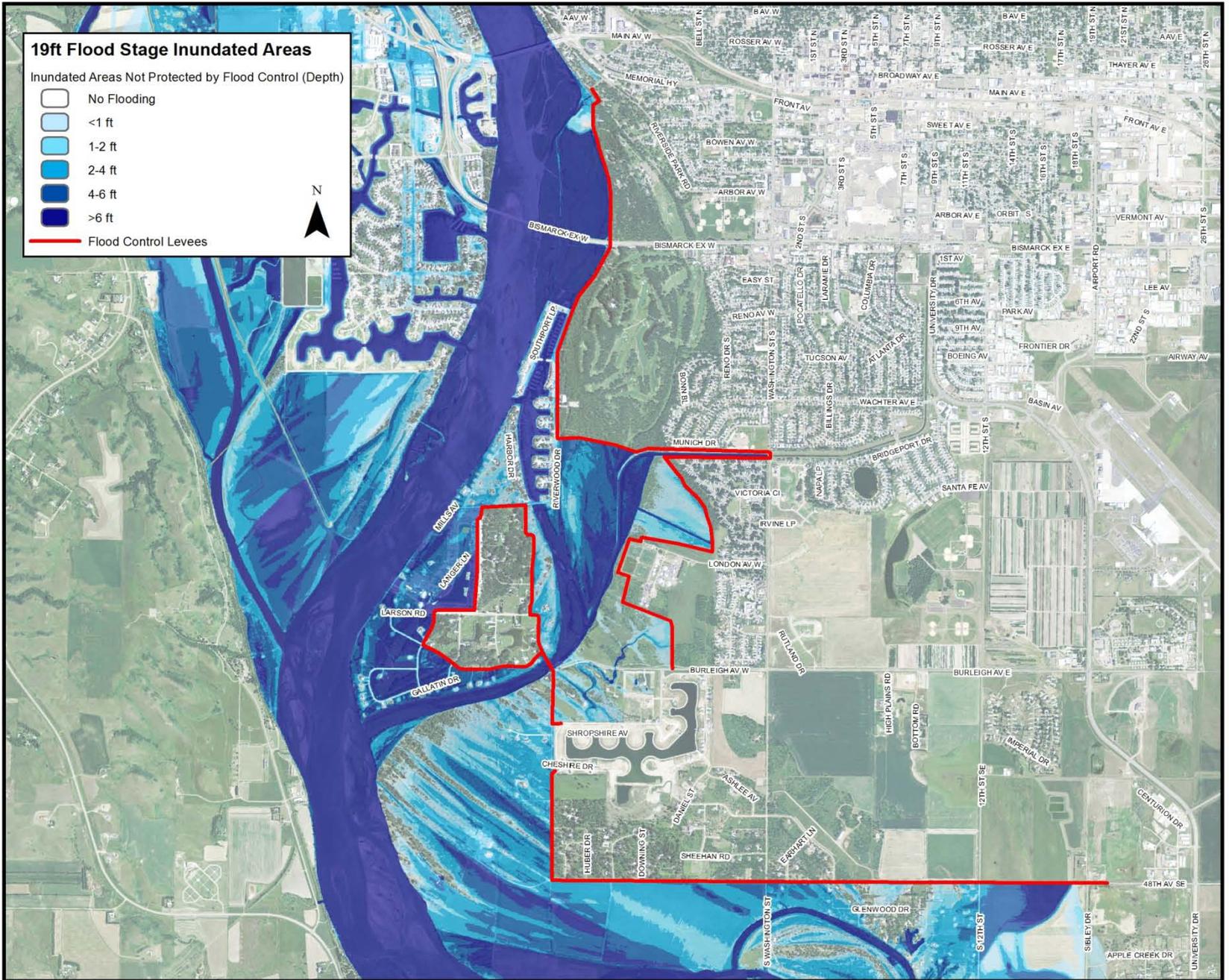
4.5 miles of plastic

**NDNG Mission
Completed in roughly 9 hours HOORAH!**

19ft Flood Stage Inundated Areas

Inundated Areas Not Protected by Flood Control (Depth)

-  No Flooding
-  <1 ft
-  1-2 ft
-  2-4 ft
-  4-6 ft
-  >6 ft
-  Flood Control Levees



48th St



Fox Island



Fox Island



Maintenance



South Central Rural Water



05/28/2011

ng Inc.

48th St



48th St



Fox Island Area



48th St



Fox Island



South Central Rural Water



South Central Rural Water



Project Finished Night of June 1

- 4.53 Miles of Levee
 - 9,425 LF Sand Trap Bags
 - 7,000 Cy Sand
 - 14,481 LF of Clay Levee
 - 68,250 CY Clay (in place)
- Couple Days of Planning and Decision Making
- 6 Contractors
- 4.5 Days of Construction

Project Finished Night of June 1

and a few exhausted people!

Questions?