

# Project Alluvion

## Municipal Streets Seminar

### November 18, 2015

# Project Alluvion

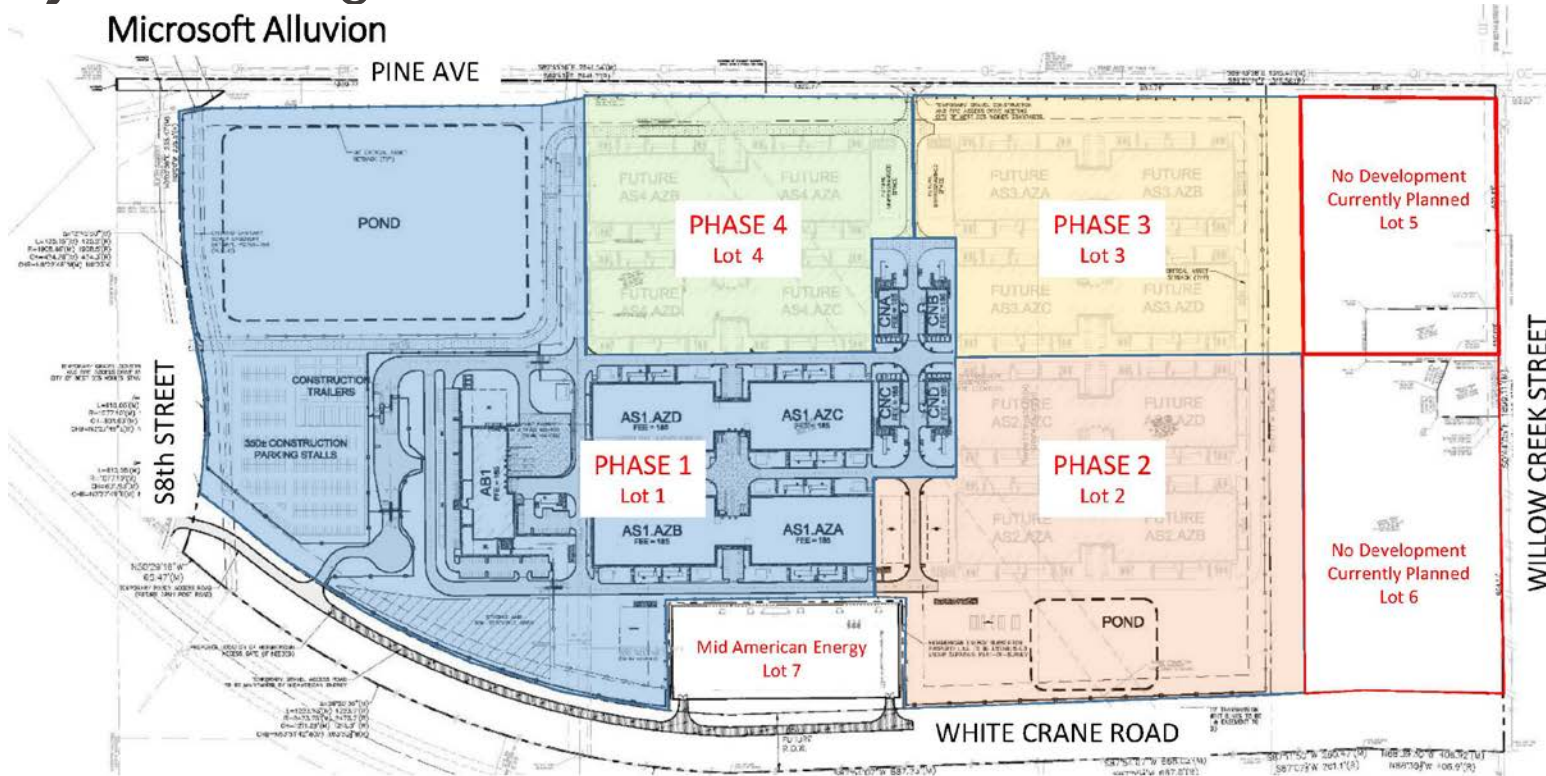
## Introductions

- Andy Denker – CTI
- Jeremy Huntsman – HR Green

# Project Alluvion

## Project Background

### Microsoft Alluvion



Microsoft DSM06-Alluvion.

Phase 1: 35,000sf Administration Building (AB1), 285,000sf of server space (AS1-AZ), 31,000sf connector buildings (CN)

Phases 2-4: addition of 4 server buildings each phase - 285,000sf each phase

# Project Alluvion

## Project Challenges



# Project Alluvion

## Project Participants / Consultants

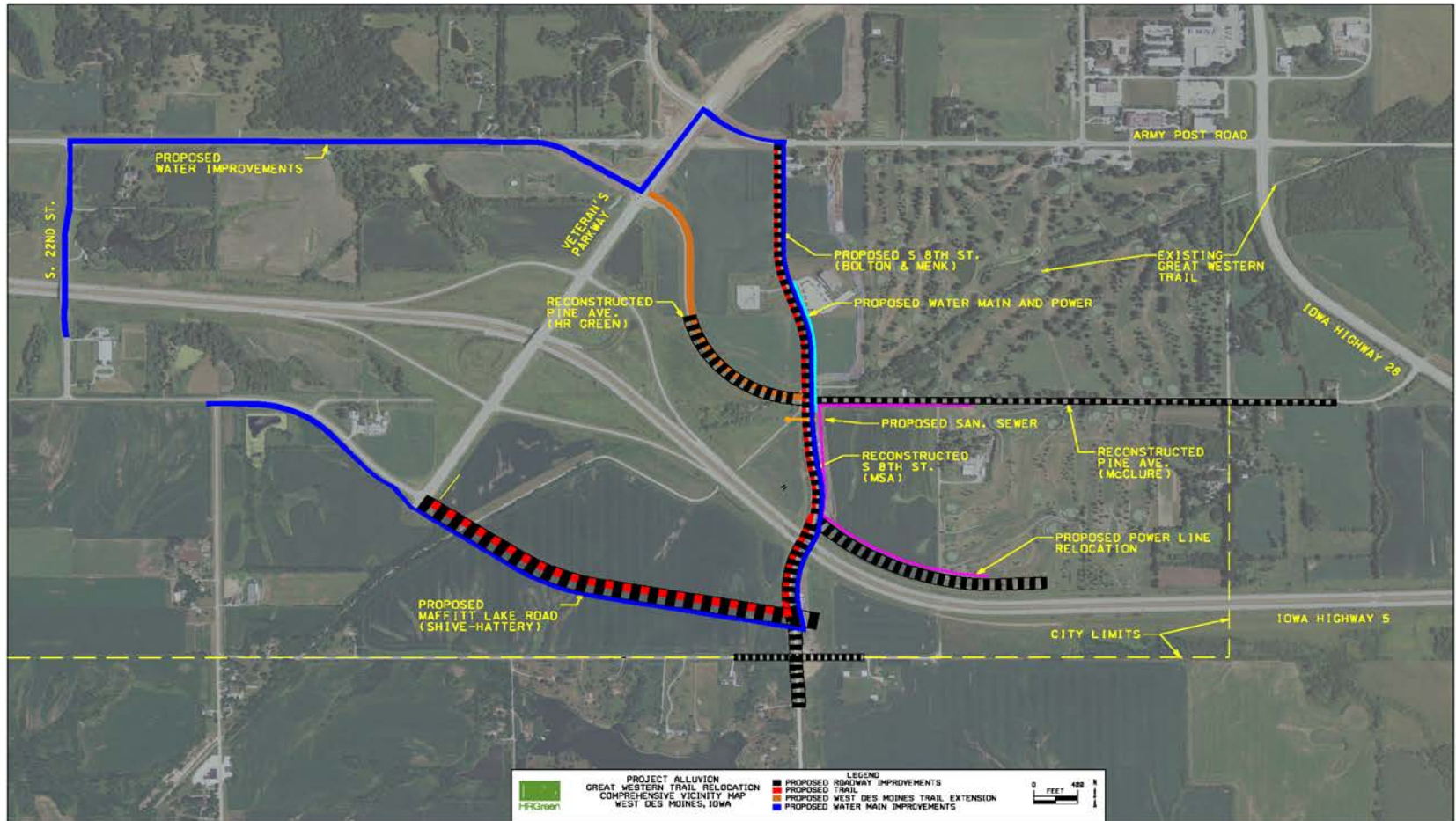
- City of West Des Moines
- CTI
- Elder Corp
- J&K Construction
- Bolton & Menk
- McClure Engineering
- MSA
- Shive-Hattery
- HR Green
- Civil Design Advantage
- Iowa State University
- Purdue University
- Oregon State University
- Louisiana Transportation Research Center
- CP Tech Center
- Iowa Concrete Paving Association
- Minnesota Dept. of Transportation
- Iowa Dept. of Transportation
- Logan Contracting

# Project Alluvion

## Timelines

- Pine Avenue – S. 8<sup>th</sup> Street to Highway 28
- Water main Connections
- White Crane Road
- Pine Avenue – West of S. 8<sup>th</sup> Street
- S. 8<sup>th</sup> Street – Pine Avenue to County Line Road
- S. 8<sup>th</sup> Street – Pine Avenue to Army Post Road
- Maffitt Lake Road – Veteran's Parkway to S. 8<sup>th</sup> Street
- Fiber Optic Connections

# Project Alluvion



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# Project Alluvion

## Why This Project is a Test Section?

- Mix of new pavement and existing pavement
- Similar traffic volumes for all streets
- Large enough to get good dataset
- Need to start sometime





# Project Alluvion

## Current Concrete Issues

- Saturation/Freezing and Thawing
- Chemical Attack
- Incremental Cracking
- Others



# Project Alluvion

## What are We Going to Do

- Sealant
- Subdrain
- Subbase / Subgrade
- Concrete mix



# Project Alluvion

## Sealant

- Pavix
  - Existing Pine Avenue joints
  - Joints for 500'
  - Entire slab for 500'
  - Right after paving machine

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## Subdrain

- Subdrain installed on all projects

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## Subbase / Subgrade

- 12" Subgrade Prep
- 12" Subgrade Prep and 6" Subbase

# Project Alluvion

## Concrete Mix

- Who is involved
  - City of West Des Moines
  - CP Tech Center
  - ICPA
  - HR Green
  - Iowa State
  - Purdue
  - Oregon State
  - Paving Contractors

# Project Alluvion

## Concrete Mix

- Concrete Mix Timeline
  - Project was Ready to Go
  - City of West Des Moines Requested a Solution
  - Meeting with ICPA – John Cunningham
  - ICPA Brought in Dr. Weiss, CP Tech Center, Dr. Rupnow
  - Formulate the Specifications
  - Meeting with Paving Contractors
  - More Specification Changes
  - Testing

# Project Alluvion

## Concrete Mix

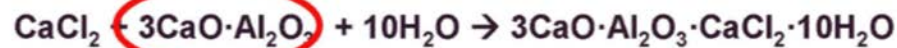
- Dr. Weiss – Calcium Oxychloride
  - Increase Fly Ash to 33%
  - Reduce Reaction of Salts with Calcium Hydroxide



# Project Alluvion

## What Causes the Calcium Oxychloride to Form

For each system the results are a little different but lets focus on  $\text{CaCl}_2$  as the salt: Reactions occur with  $\text{C}_3\text{A}$  and CH



Friedel's salt



Monosulfate ( $\text{AF}_m$ )

Friedel's salt

Gypsum

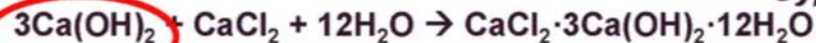


Monosulfate ( $\text{AF}_m$ )

Kuzel's salt

+ 0.5 ( $\text{CaSO}_4\cdot 2\text{H}_2\text{O}$ )

Gypsum



Calcium Oxychloride

The hypothesis is that without  $\text{C}_3\text{A}$  and CH these reactions should not occur

# Project Alluvion

## Concrete Mix

- Minnesota Spec and Modifications to Spec
  - Air – Minimum of 6% Behind Paver
  - W/C ratio – 0.40 Target, 0.42 Maximum
  - 400 lbs Cement Minimum
  - Testing – ISU Testing Results to Date
  - Test Section

# Project Alluvion



# Project Alluvion

## Construction

- Collaboration
- Issues before paving
- Aggregates
- Pricing
- Previous experience
- Test section
- Fly ash
  - Availability

# Project Alluvion

## Construction

- Adjustments made first day
- Actual workability
- Air loss
- Water
- W/C discussion
- Power settings
- Temperamental mix



# QUESTIONS FROM THE AUDIENCE

Ask away...