Bridge Investigation Report

May 5, 2015

Russell Hill, County Assessor
Eva Madison, Justice of the Peace
Carl Gales, Technical Advisor/Citizen

Investigation Overview

- Began investigation on Wed., April 22, 2015
- Concluded interviews on Mon., May 4, 2015
- Over 7 days, interviewed 16 current and former County employees
- Attempted to interview an additional 6 current and former employees who refused or could not be reached
- Met with structural engineer who prepared plans
- Reviewed construction photos, work logs, and engineering plans and gathered additional docs
- Visited bridges

Investigation Overview

- Bridge Crew: Interviewed former supervisor (retired), former lead (resigned during investigation), and one crew member; four crew members unwilling to be interviewed (two resigned during investigation)
- Tile Crew: Interviewed current supervisor/ former lead, current lead, and two crew members; unable to interview former supervisor (on LOA)

Harvey Dowell Bridge

Harvey Dowell Bridge

- Original Harvey Dowell Bridge was built in 1926. It last had a weight limit of 7 tons and had been deemed “structurally deficient.”

Original Bridge, 1926

Harvey Dowell Bridge

April 29, 2015

Harvey Dowell Bridge

From Google

Harvey Dowell Bridge

- Bridge goes over west fork of the White River east of Fayetteville on County Road 195/Mally Wagnon Road/Harvey Dowell Road.
- Bridge is located in JP Butch Pond's district.
- Demolition of old bridge began in January 2013.
- New bridge opened in December 2013.
- Weight limit was reduced to 3 tons in March 2015.

Stonewall Bridge

Stonewall Bridge

Original Stonewall Bridge, date unknown
Last weight limit: Code 4-9 tons; Code 9-10 tons;
Code 5-11 tons. (Photo from Google)

Stonewall Bridge

From Google

Stonewall Bridge

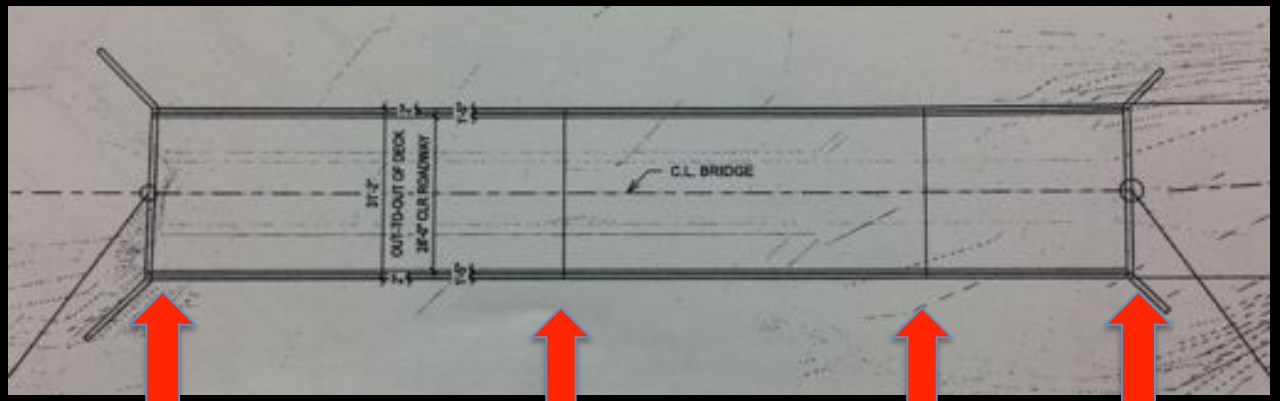
May 2, 2015

Stonewall Bridge

- Bridge goes over Muddy Fork Creek, a tributary of the Illinois River, west of Prairie Grove.
- Bridge is located in JP Joel Maxwell's district.
- Demolition of old bridge began in September 2014.
- Bridge remains incomplete.

Basics of The Two Bridges

- Two abutments/walls at either end, with two center supporting piers, and beam spans in between.



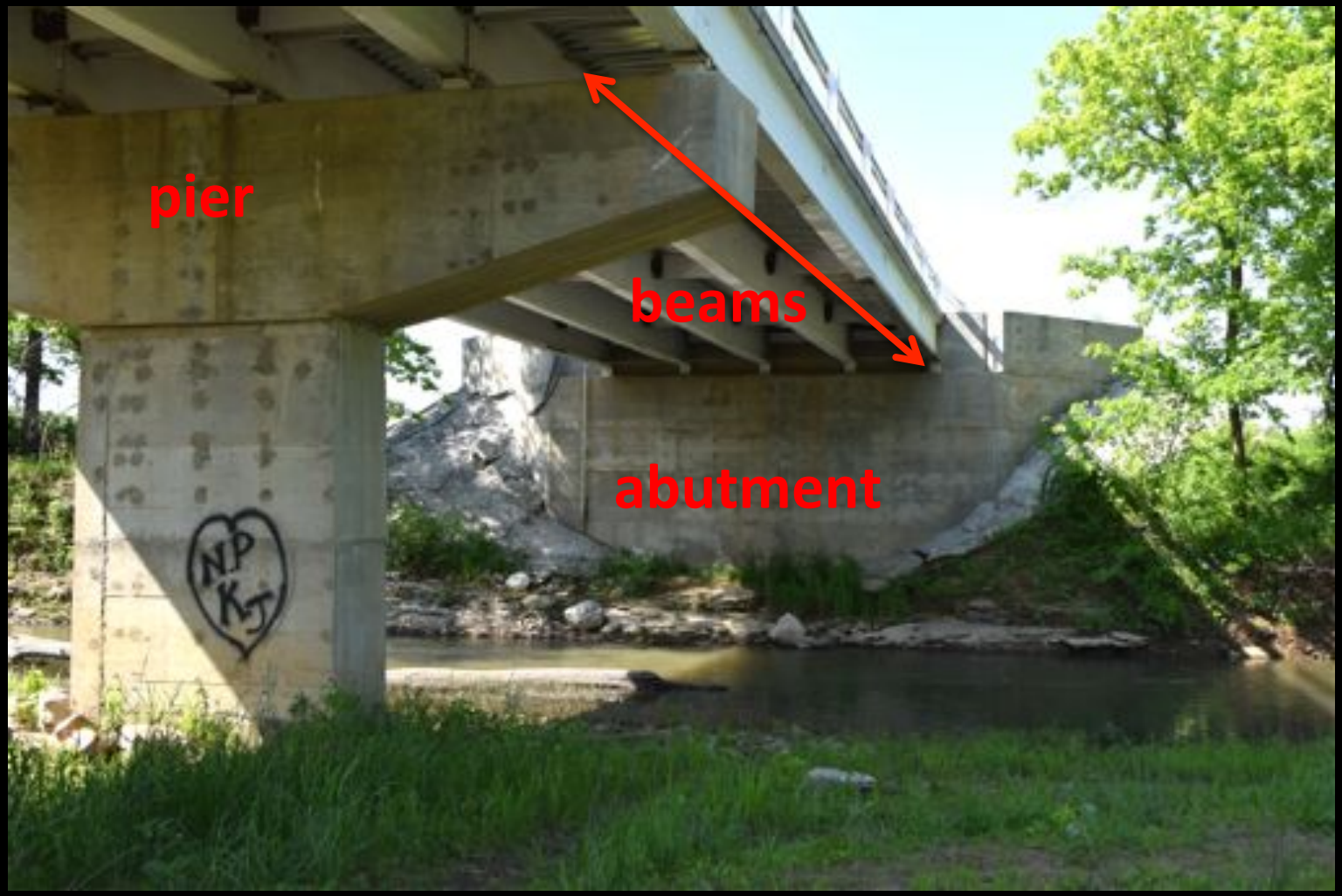
abutment

pier

pier

abutment

Basics of The Two Bridges



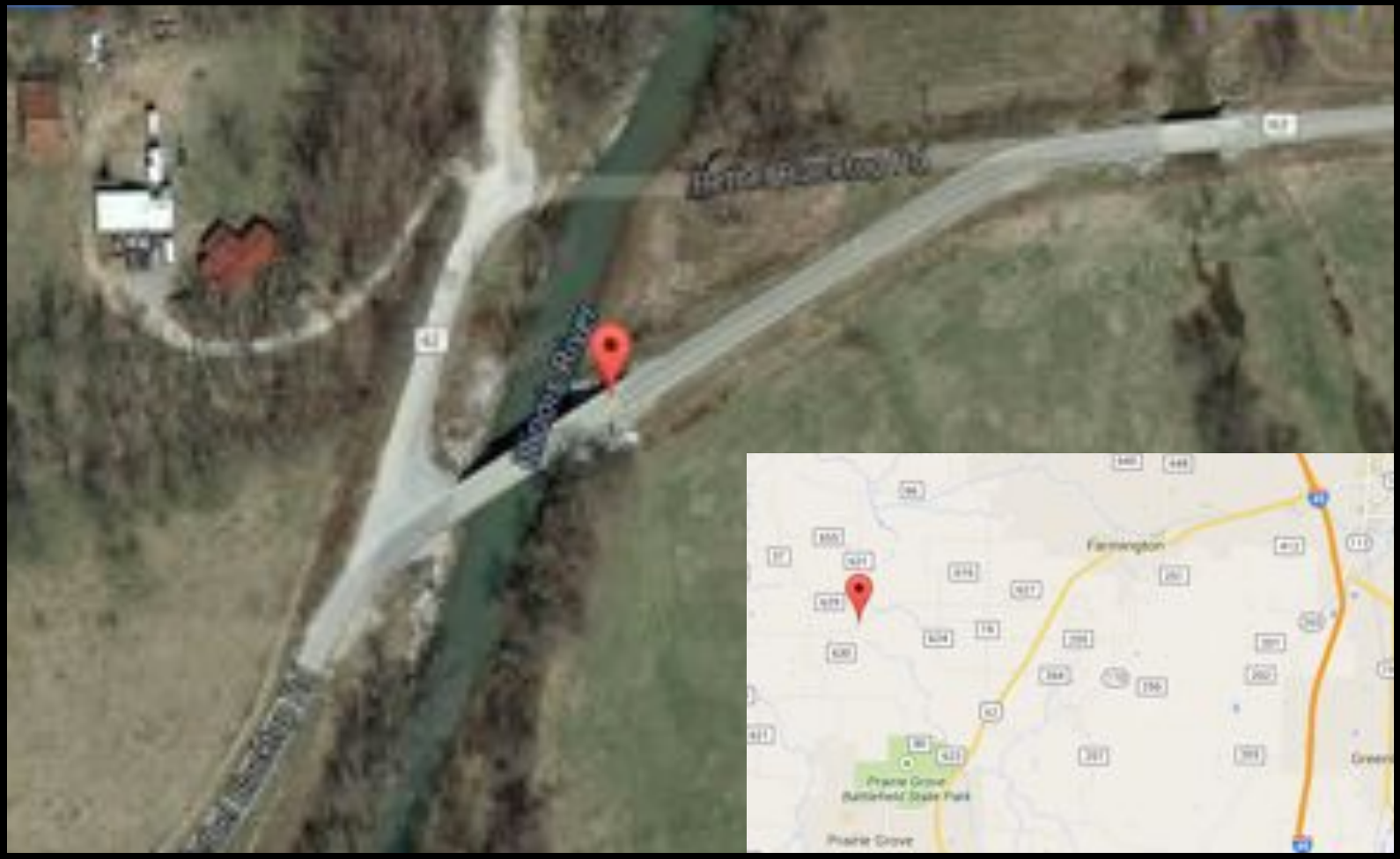
Bridge Crew Background

- In recent years before Harvey Dowell in 2013, the Bridge Crew primarily performed bridge maintenance and repairs and installed “pre-fab” bridges or “box culverts.” AHTD does not consider these “bridges.”

County Road 62 Bridge

- Last comparable bridge built – with support piers and abutment walls – was in 2007 under former Judge Jerry Hunton.
- Believed to be the only other County bridge built with engineering plans.
- Located off Highway 62 on County Road 62/ Bethel Blacktop Road west of Farmington, over the Illinois River.
- Located in JP Rich Cochran's district.

County Road 62 Bridge



From Google

County Road 62 Bridge

May 2, 2015

County Road 62 Bridge

County Road 62 Bridge

- Built with similar construction techniques
- Built with some of the same crew

Osage Creek Bridge

- During the investigation, we learned of deficiencies with a box culvert north of Highway 412, west of Elm Springs, on Osage Creek Road.
- We were told it should be "condemned immediately" because concrete and water erosion had caused part of the road to cave in.
- We heard this from two witnesses; one showed us photos on his phone.
- They said they had been complaining for months, without success. Prior temporary fixes to the bridge had been unsuccessful.

Osage Creek Bridge

From Google

Osage Creek Bridge

- We promptly notified the County Judge's office the day we learned of the problem.
- The bridge was replaced the following day, on Thursday, April 30.

Osage Creek Bridge

Question 1: Engineer's Specifications

- Did the Road Department build the Stonewall Bridge and the Harvey Dowell Bridge to engineer's specifications?
- Answer: *No. Details to follow.*
- Was engineer consulted on the deviations?
- Answer: *No.*
- Deviations from plans were not documented.

Footings

- Plans state: "Footings shall be founded a minimum of 1'0" into the material designated as chert/limestone," which requires excavation to the rock and then one foot down to achieve a solid base.
- In most instances, crews did not reach this depth, but drilled into the rock instead and set in #11 rebar. The rebar was not epoxied or otherwise anchored in place.

Footings

- Plans state: "Prior to pouring concrete, allowable bearing pressure shall be verified by geotechnical engineer."
- No such testing was performed until March 2015.

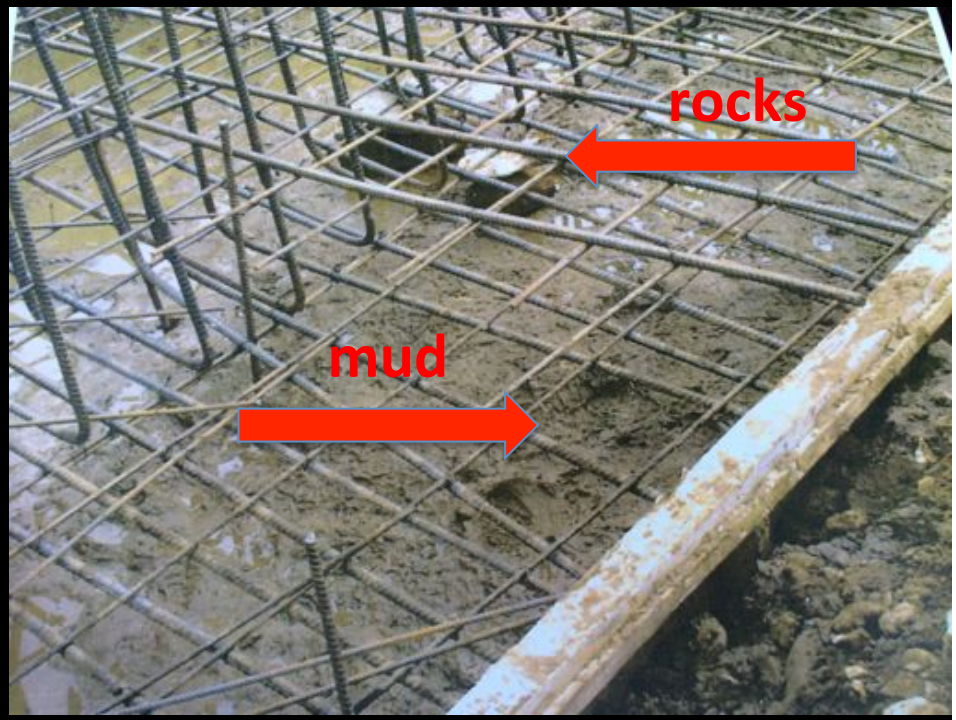
Footings

- Crews fought water and mud while digging footings. In one instance at Stonewall, they encountered a spring near a footing on the west side.
- They used pumps, but we received several reports of concrete being poured on top of mud and water.

Stonewall east abutment

Footings

- In some instances, when surfaces were not level, rocks were used to prop up steel mats, which is contrary to AHTD standards (although common).

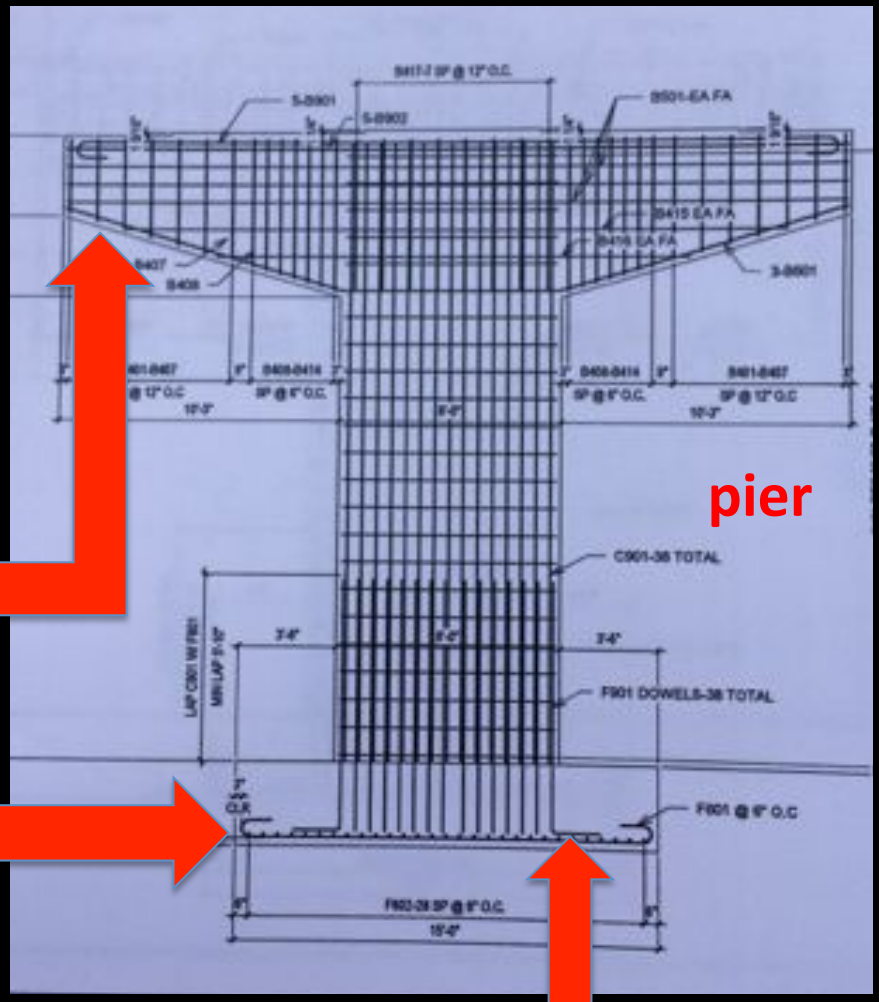


Bent Steel in Plans

- Plans call for bent steel/rebar in multiple applications. Examples:

Bent corners to form cage around rebar grid

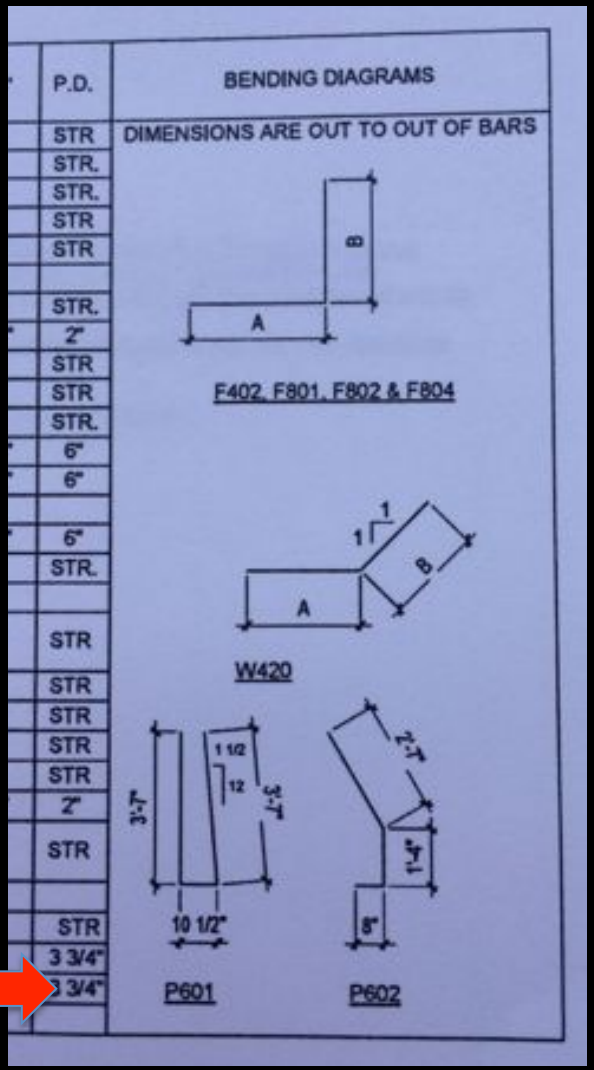
“hook” bar



“L” bar

Bent Steel in Plans

- Per plans, AHTD standards apply: “Bars shall be bent cold, unless otherwise permitted by the Engineer. No bars partially embedded in concrete shall be field bent, except as shown on the plans or specifically permitted by the Engineer.”
- Heat bending reduces the strength of the steel
- Plans provide specs for bending



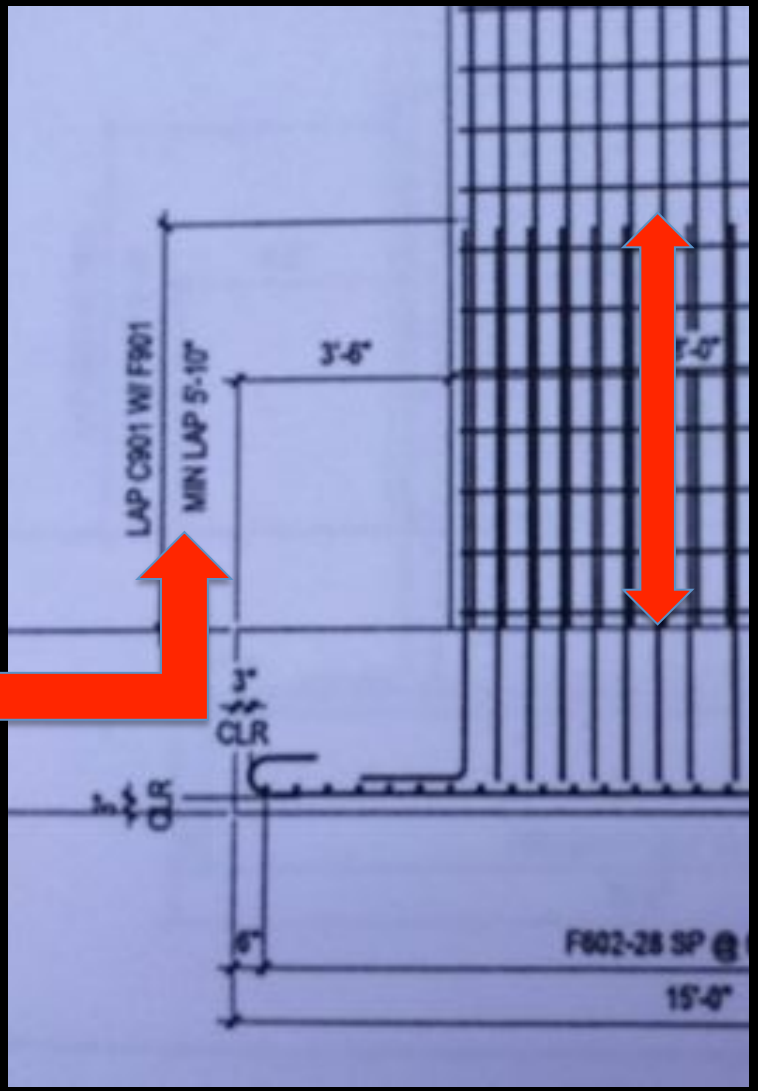
Bent Steel as Built

- In some applications, including particularly in footers, bent rebar was replaced with straight rebar.
- In other applications, rebar was bent with a torch/heat, mostly on-site.
- Why? Road Department did not order rebar bent to specs, but ordered it straight. Bent in shop with older machine. Bars would break sometimes. Unable to bend above #6 rebar.
- Acquired proper bender in December 2014.

Steel Rebar Lap

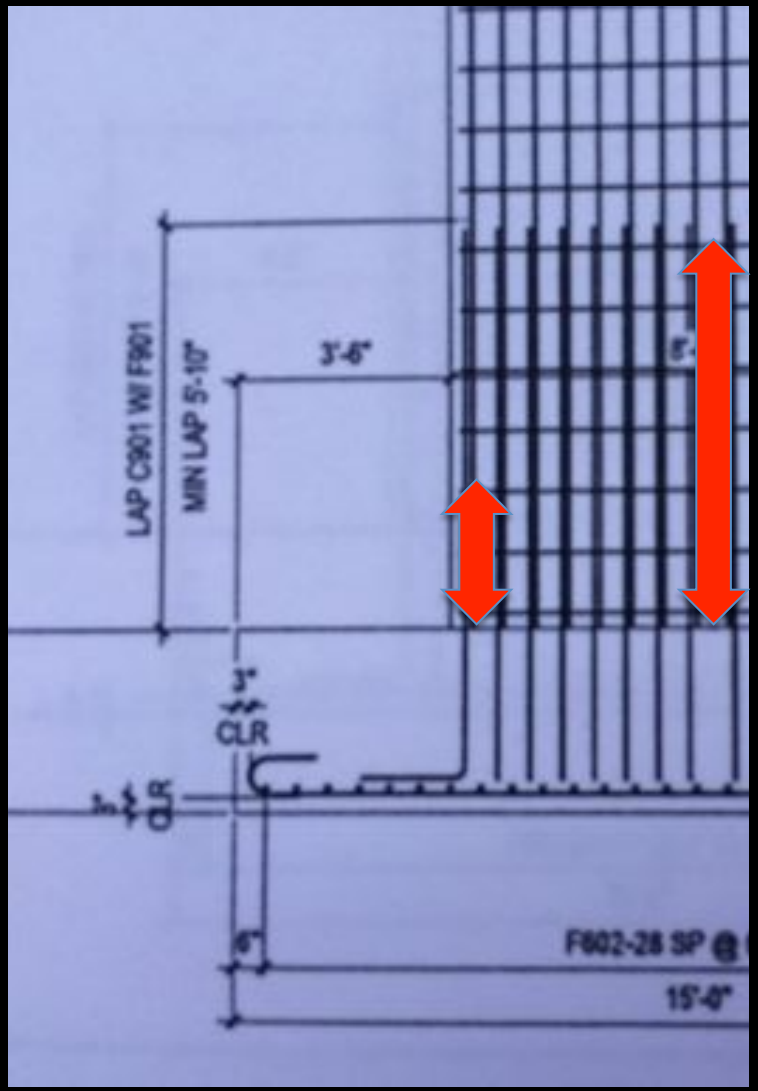
- Plans call for minimum lap lengths in walls and piers.

MIN LAP 5’ 10”



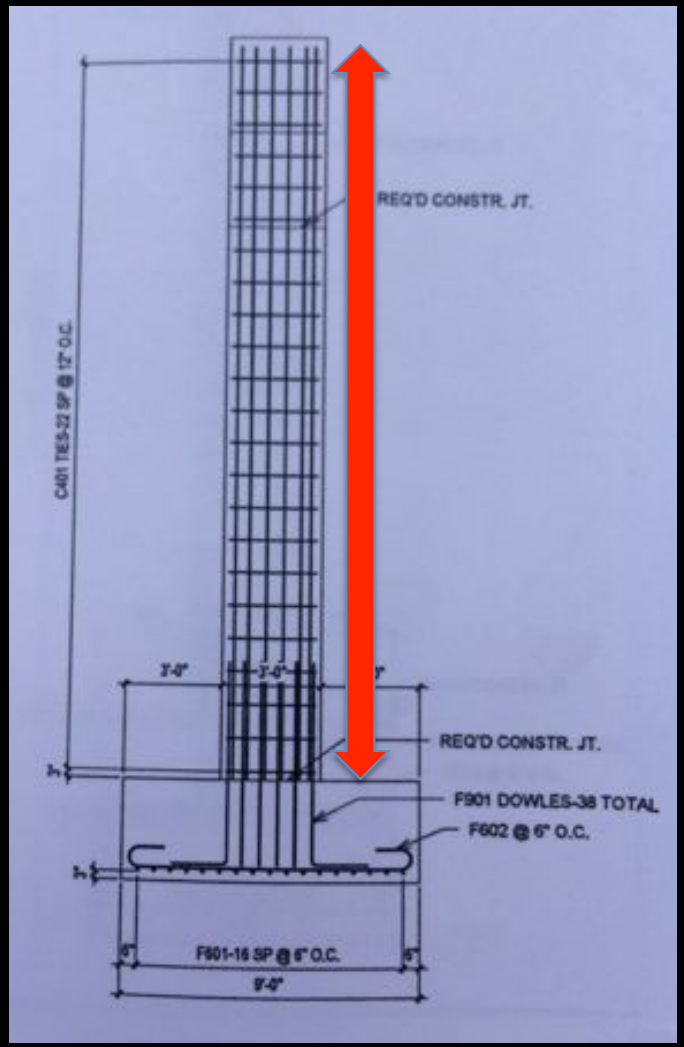
Steel Rebar Lap

- Crews understood 2’ or 3’ was always sufficient for lap length.



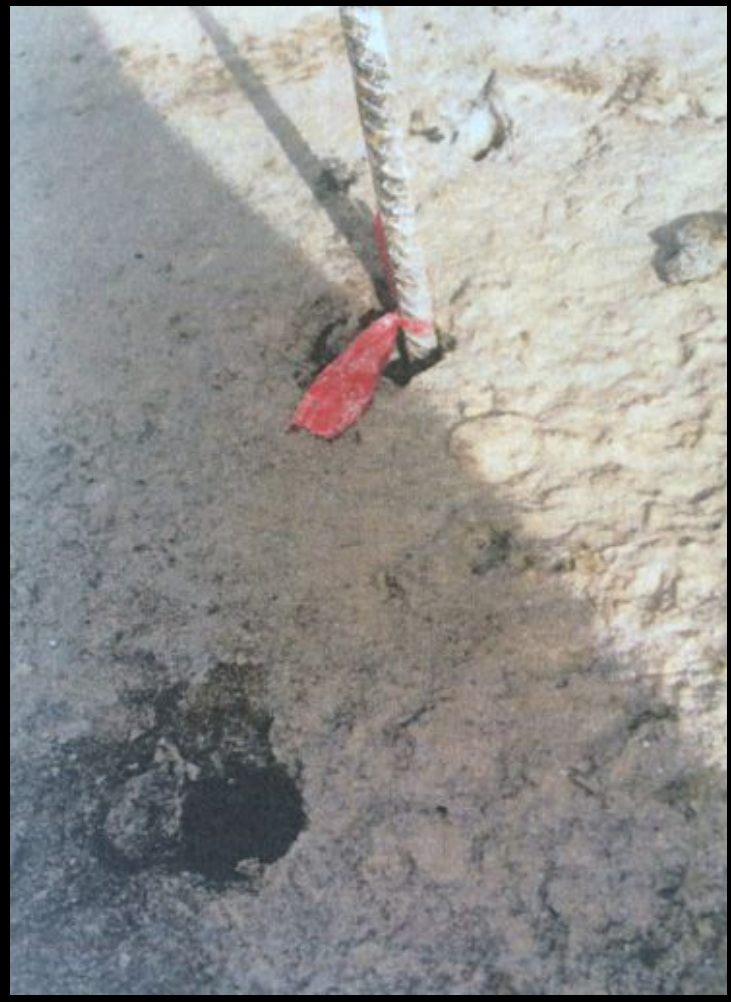
Continuous Steel Rebar

- Plans call for continuous steel bars
- Crews did not use continuous steel due to difficulty keeping it held up and prior experiences with it falling
- Lapped bars together instead



Steel Placement

- In some instances, crews did not place steel before the concrete pour.
- Steel was added to the wet concrete after the fact and thus not tied in.
- In some instances, crews drilled holes into set concrete to add steel after the fact.



Steel Placement

- Crews were unfamiliar with epoxy.
- Did not use epoxy until sometime in late fall 2014 after questions were raised about the bridges.
- Used in east/Prairie Grove side abutment wall of Stonewall.

Other Concrete Issues

- Pouring from heights ranging from 3-4 feet, 5-6 feet, to 20 feet. Would sometimes fall over steel/rebar. Causes segregation.
- Concrete pump truck used infrequently
  - For road deck only at Harvey Dowell
  - Only late in process at Stonewall after recommended by geotechnical engineer

Other Concrete Issues

- Honeycombing due to lack of vibration (required by AHTD standards)
- From American Concrete Institute (ACI): Honeycomb = "voids left in concrete between coarse aggregates due to inadequate consolidation."
- Honeycombing will accelerate deterioration of the concrete due to freeze-thaw because moisture can easily work its way into the honeycomb areas.

Honeycombing versus Smooth

Harvey Dowell Decking

Smooth

Stonewall New East Pier

State Project Hwy 16

Honeycombing at base of pier

Harvey Dowell

Honeycombing at base of pier

Harvey Dowell

Honeycombing in abutments

Stonewall East Wall

Honeycombing

62 abutment cold joint

Other Concrete Issues

Harvey Dowell Pier

Concrete Joints

- Generally did concrete pours using plywood forms.

Concrete Joints

- Dry concrete was not prepared to ensure wet concrete adhered to dry concrete at joints.
- Typically, you clean and score dry concrete before next pour.

Water Levels Very High

Logs in steel beams under 62 bridge

Water's Wear at 62 Bridge

Water getting under footing?

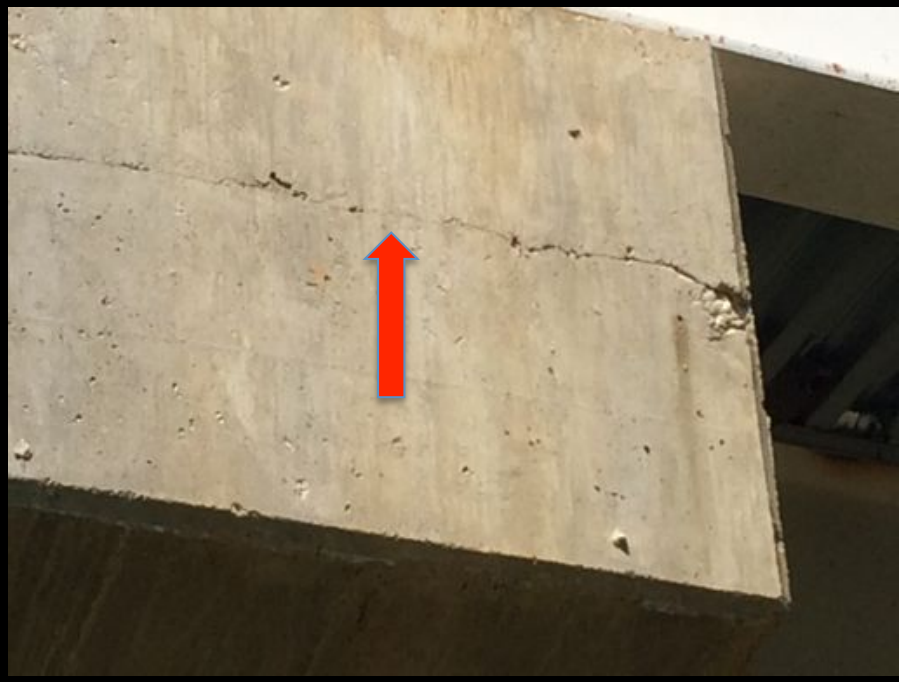
Water's Wear at Harvey Dowell

Seam in north abutment wall

Cracks in Concrete

- Cracks are visible at Harvey Dowell

southwest abutment



cap of pier

Cracks in Concrete

- Cracks are visible at Harvey Dowell

cap of pier

northeast abutment

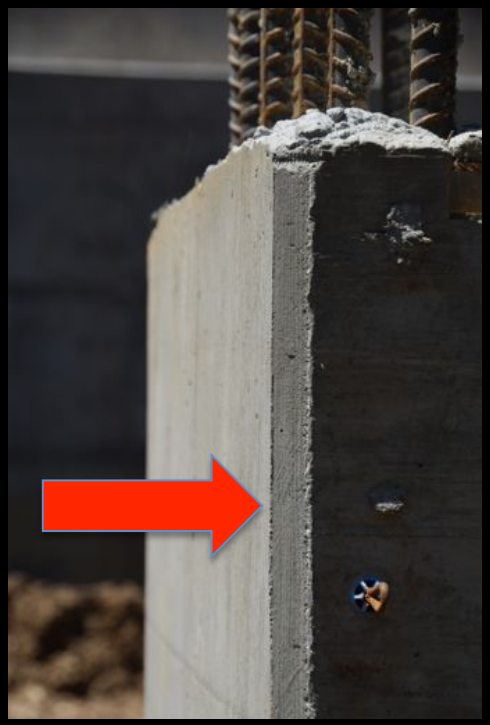
Cracks in Concrete

- Cracks are visible at 62 Bridge

abutment

Chamfered Edges

- Plans: “All exposed corners shall be chamfered ¾” unless otherwise noted.



New pier at Stonewall

Harvey Dowell south abutment

Temperature

- Concrete was poured in cold weather, which requires particular attention. For example:

Date	Bridge	Work	Avg.	Low	High
Feb. 12, 2013	HD	Footings	38.7°F	28.0°F	51.1°F
Mar. 6, 2013	HD	Wall/Footings	34.5°F	23.0°F	48.0°F
Mar. 20, 2013	HD	Wall	39.7°F	27.0°F	53.1°F
Nov. 7, 2013	HD	Roadway	40.3°F	26.6°F	60.1°F
Nov. 8, 2013	HD	Roadway	44.1°F	27.0°F	63.0°F
Nov. 20, 2014	SW	West wall	36.5°F	21.0°F	59.0°F
Dec. 17, 2014	SW	Pier cap	30.2°F	25.0°F	37.9°F
Jan. 30, 2014	SW	Footings	34.2°F	21.0°F	61.0°F

Material Quality Issues

- No concrete test cylinders performed until late in process at Stonewall – done to test strength and quality
- No materials certifications
- Used red iron with no certifications

Beams and rebar left at Stonewall site

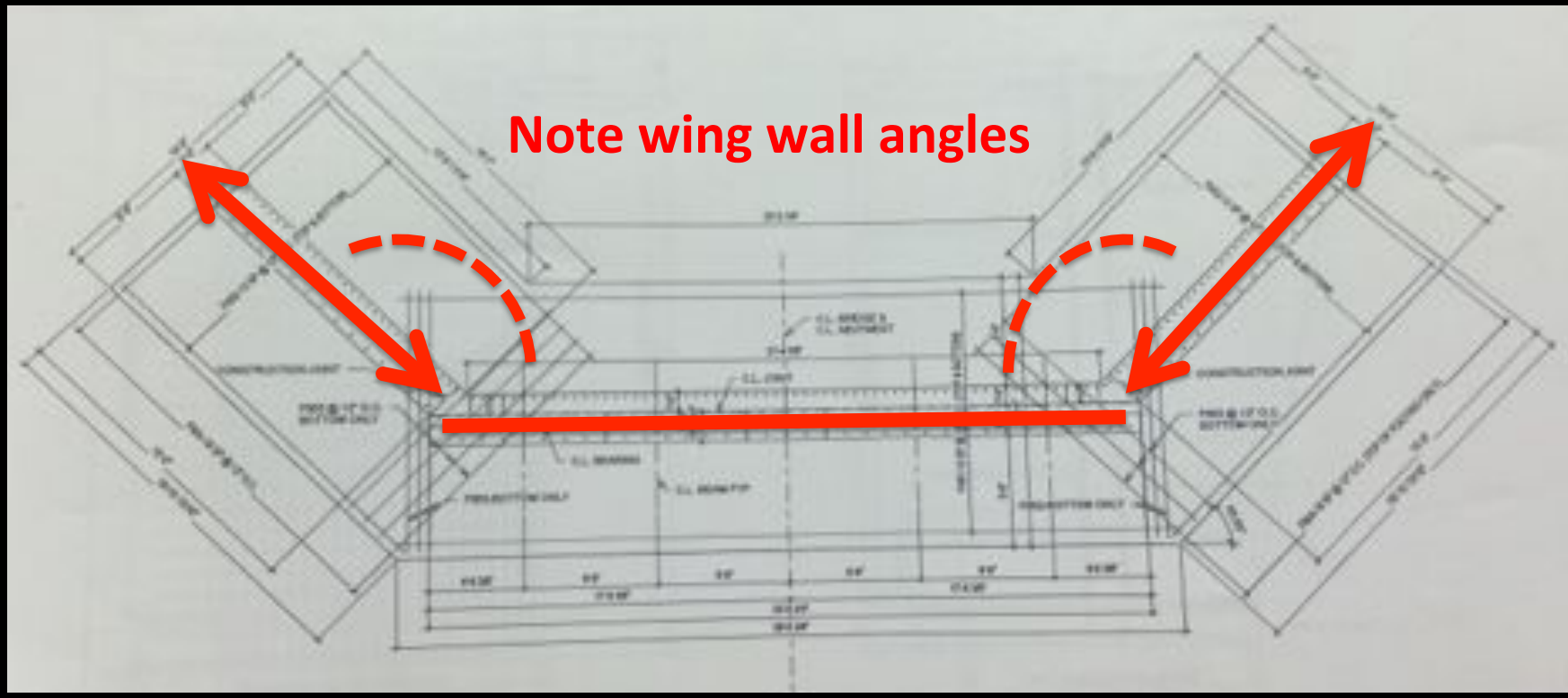
Material Quality Issues

- From AHTD standards: "Steel reinforcement shall be protected from damage. When placed in the work, it shall be free from dirt, detrimental rust or scale, paint, oil, or other foreign substance."
- "Steel reinforcement shall be stored above the ground on skids, platforms, or other supports."

Material Quality Issues

Rebar left at Stonewall site

South Abutment at Harvey Dowell



plans

South Abutment at Harvey Dowell

- Compare wing wall angles on north abutment, which are “to plan”

from Google

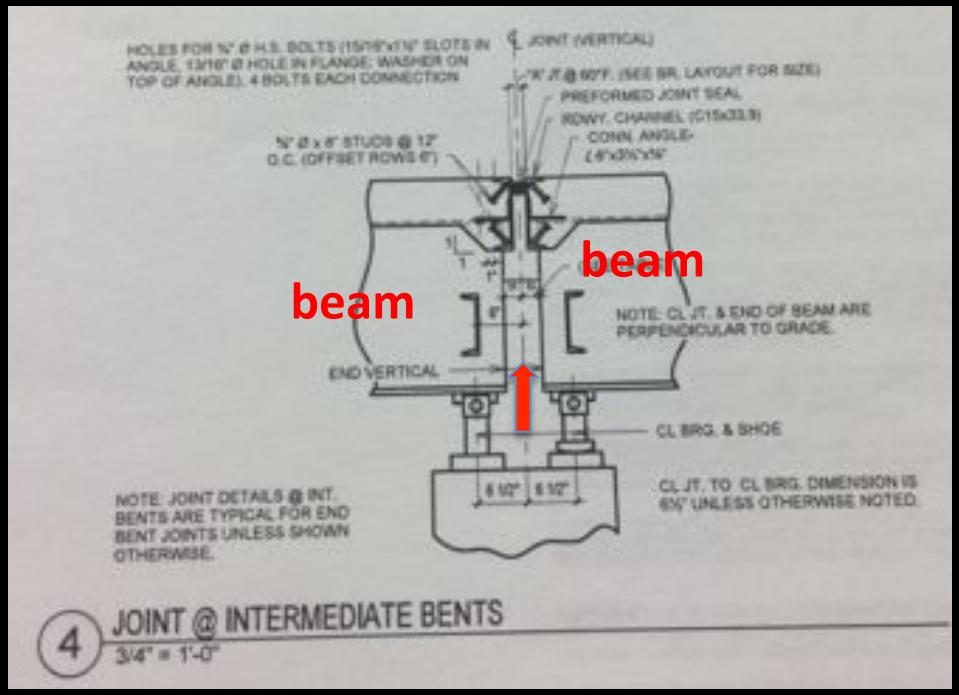
South Abutment at Harvey Dowell

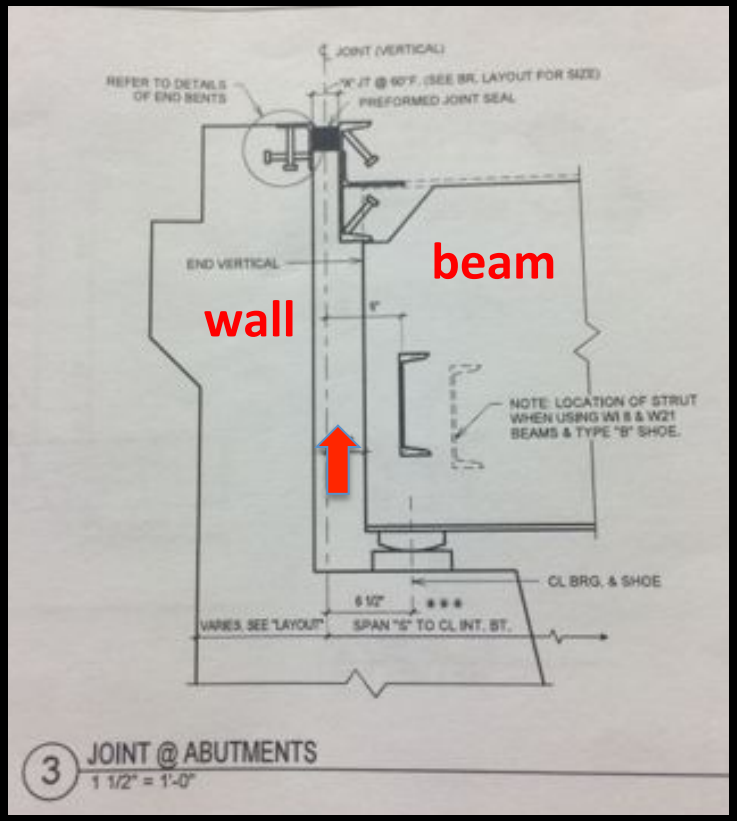
from Google

South Abutment at Harvey Dowell

Harvey Dowell Beams

- Plans call for steel-to-concrete spacing of 1 ¾” at joint abutments.





- Allows for bridge to expand/contract

Harvey Dowell Beams

Intermediate joint

Beam resting on south abutment wall

Harvey Dowell Beams

Beam resting on north abutment wall

Harvey Dowell Beams

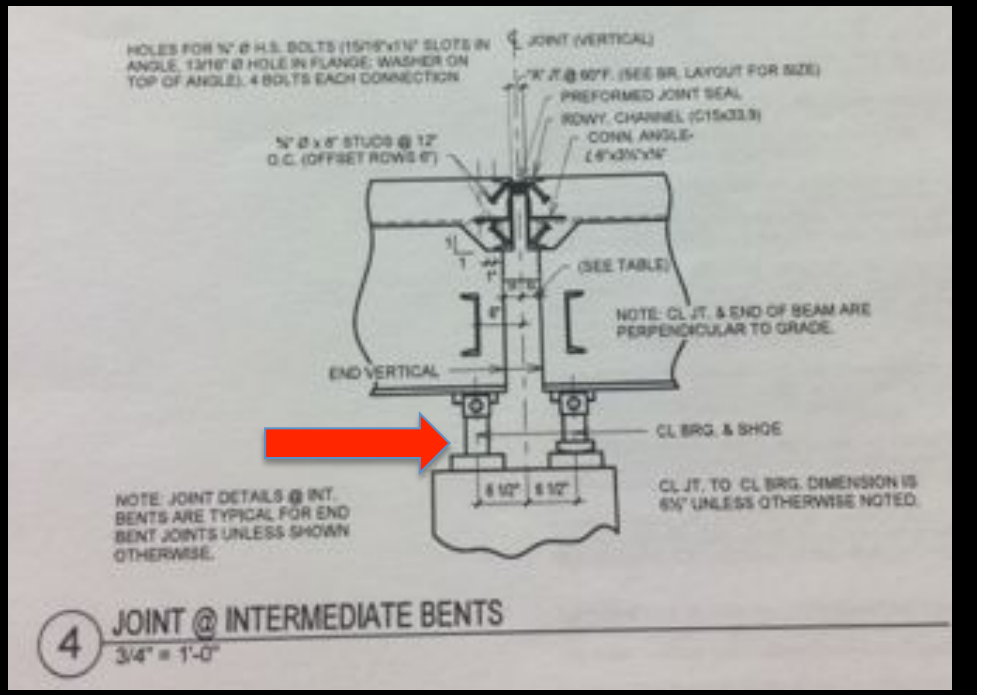
- Addressed in AHTD report in Dec. 2013 and repair made, but problem still appears today.

Harvey Dowell Beams

- Beam did not fit, so it was modified with a torch.

Harvey Dowell Beam Bolts

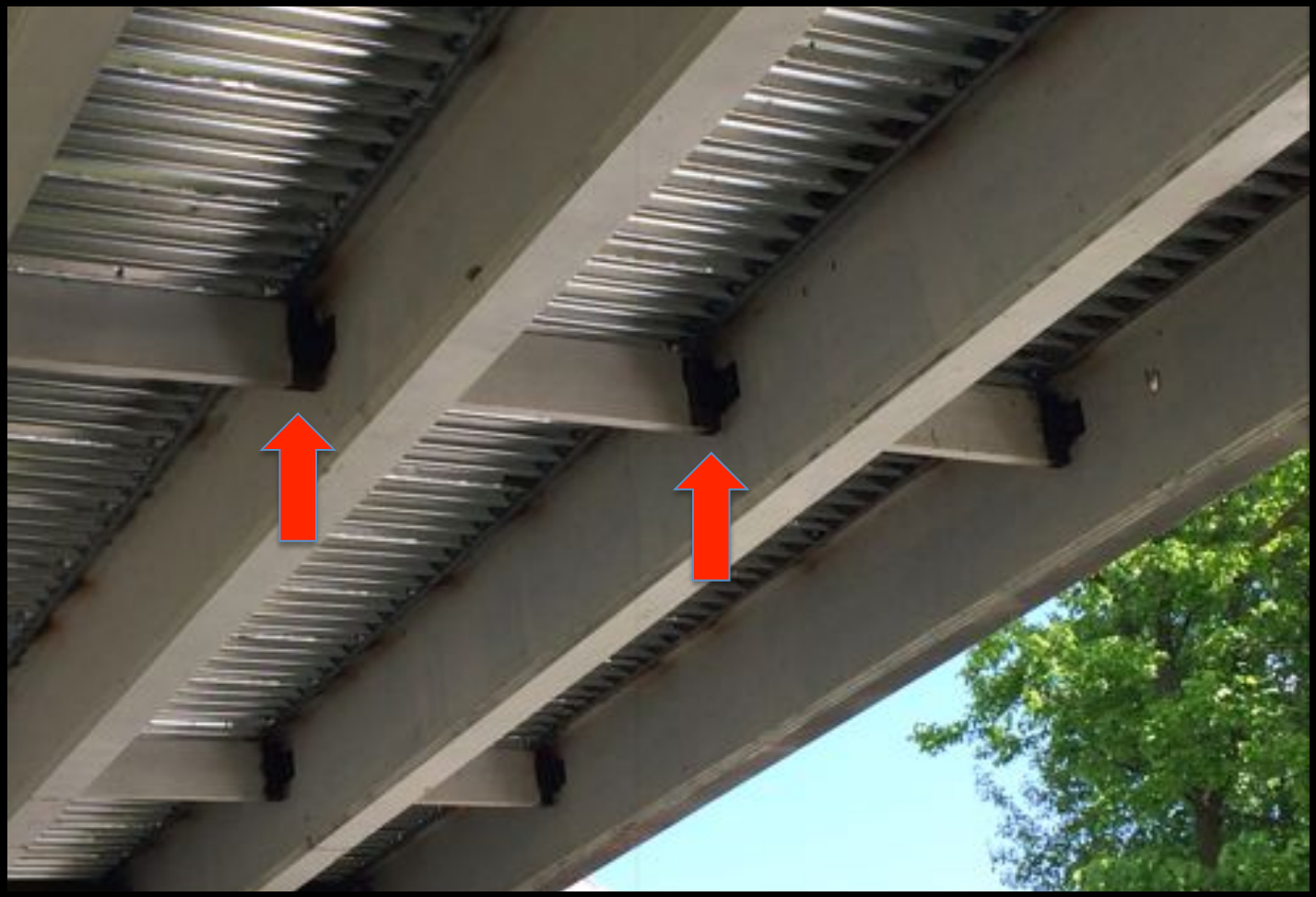
- Beams are bolted to piers and abutments with large bolts.
- Plans call for sleeves in top of piers/abutments to attach bolts



Harvey Dowell Beam Bolts

- Sleeves were not used.
- Crews attempted to drill holes in piers/ abutments after the fact to affix bolts.
- Sometimes, crews encountered steel/rebar, making drilling difficult or impossible.
- Reports that two or three bolts left out. Other reports that two or three bolts were not attached to full depth.
- Loose bolts visible underneath structure.

Incomplete Painting



Harvey Dowell

Incomplete Painting

62 Bridge

Tine Finish

- Plans state: "Bridge deck: the concrete bridge deck shall be given a tine finish as specified for final finishing in subsection 802.19 for Class S Tined Bridge Roadway."
- Tine finish increases safety by allowing for better traction.
- Then "Class 1 protective surface treatment shall be applied to the roadway surface," i.e., boiled linseed oil.

Tine Finish

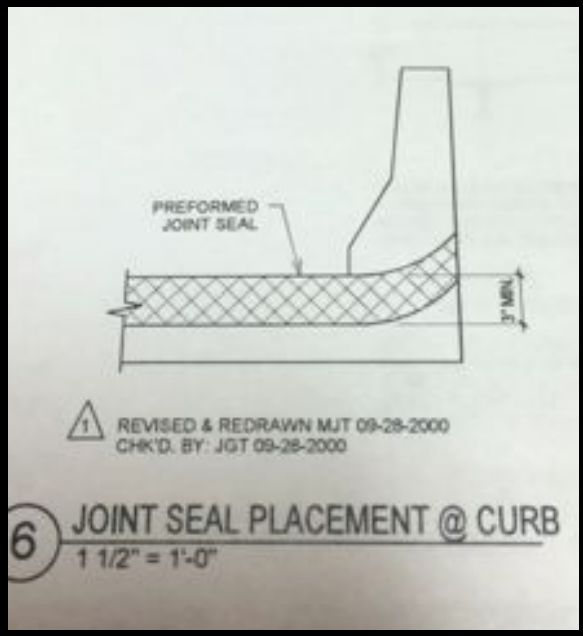
State Project Hwy 16

No Tine Finish

Harvey Dowell Deck

Curb/Guard Rail

- Plans call for curbed concrete wall at road deck edge.
- No curb installed, so nothing at road edge.
- Used guard rail instead.
- Plan deviation is visible to anyone.
- Did not think they had ability (e.g., forms) to do per plan.



Harvey Dowell Curb/Guard Rail

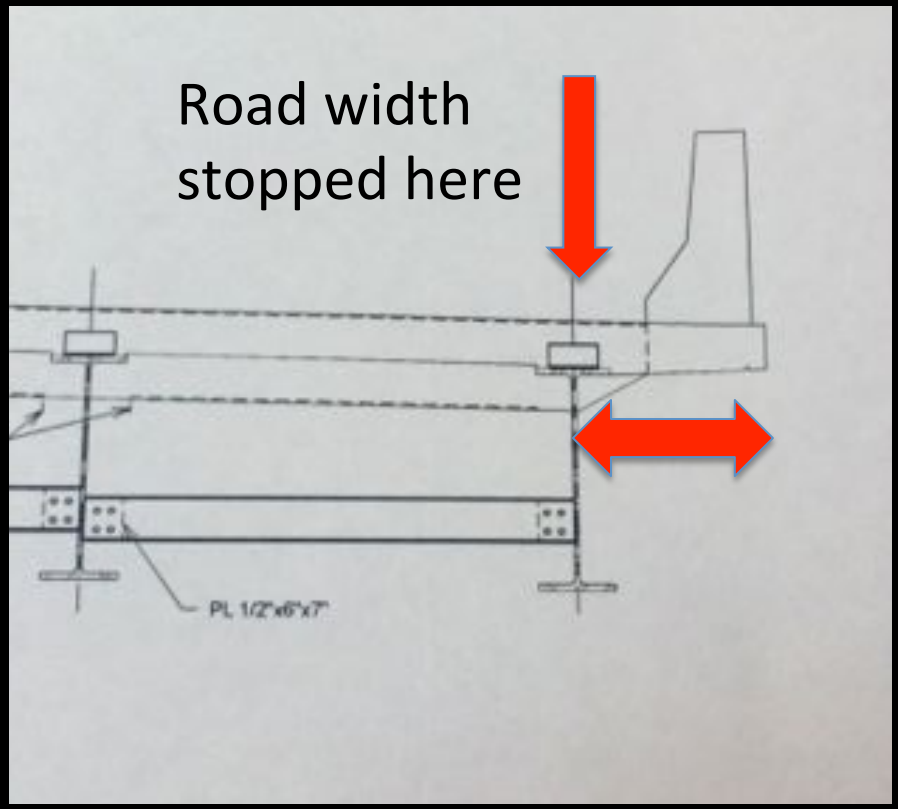
County Road 62 Guard Rail

“Per Plan” Curb/Guard Rail

From current State bridge project, Highway 16 east of Fayetteville

Harvey Dowell Road Width

- Road deck width not to plan
- Exclusion of concrete curb included exclusion of that width



Harvey Dowell Road Width

Harvey Dowell Road Width

County Road 62 Width

Decking Rebar Spacing

- Reports that rebar spacing on roadway deck farther apart than plan spacing.
- 12” centers versus 9” centers.

Harvey Dowell

West Wall at Stonewall

- No form used when footer poured, which is not necessarily improper, but resulted in the use of considerably more concrete than was required.
- Required an estimated 60 additional yards of concrete.

Question 1: Engineer's Specifications

- Why were the deviations made?
- Answer: *Because no one knew better. There was a lack of knowledge and training on how to read engineering plans and on the significance of following the plans.*
- *AHTD's standards, which were incorporated into the plans, were not consulted.*
- *There was even confusion as to who had copies of the plans.*

Question 1: Engineer's Specifications

- *The Bridge Crew was used to doing things the way they had always done them. There was also a mentality that "The County can build a bridge however it wants to."*
- *Several workers expressed concerns or asked "are we doing this right?"*
- *There was a reluctance to deviate from the way things had always been done.*

Question 1: Engineer's Specifications

- *Other crews and workers assisted – the Tile Crew in particular – and there was a breakdown in supervision on the job site, with crews working independently of one another and no single person "in charge."*
- *Also questions about whether the Road Department had the proper tools and equipment to build bridges of this magnitude.*

Question 1: Engineer's Specifications

- *At Harvey Dowell, witnesses described days where the job site felt "chaotic" or "not organized," with too many workers not knowing what they were supposed to be doing.*
- *Witnesses described feeling rushed and sensed some type of artificial deadline on the Harvey Dowell bridge.*

Question 1: Engineer's Specifications

- Who was responsible for the deviations?
- Answer: *This varies. Some said the Bridge Supervisor and Lead Man directed their work, but others said they took direction from the Superintendent, who was on-site almost every day. When the Tile Crew was working, they worked under their own supervisor.*

Question 1: Engineer's Specifications

- Who knew the plans were not being followed?
- Answer: *That the plans were not being followed was no secret. Work logs, as well as visual inspection of the work itself, show that the plans were not being followed. The Superintendent and Assistant Superintendent were often on-site, and witnesses state they were involved in and aware of plan deviations.*

Question 2: County Judge's Office

- Did anyone notify the County Judge's office that the plans were not being followed?
- Answer: *Yes, but it is unclear precisely when. The Judge's office was informed by at least Thanksgiving 2014.*

Key Dates

- Early October 2014*:
  - Video is taken.
  - Someone contacts AHTD claiming County is "cutting corners" on bridges. AHTD engineer contacts Asst. Superintendent.
  - Shain Bergan at Channel 5 contacts Superintendent and possibly others.
  - Anonymous complaint works its way to the Arkansas Department of Labor about a problem with an earthen wall. The State investigates.

*Due to the Braswell lawsuit, we were unable to investigate possible complaints before this time.

Response

- Asst. Superintendent goes to Stonewall site and talks to crew about call from AHTD. Informs them the County can build a bridge however it wants, but he states he also told them to follow the plans.
- There are some changes to the construction process after this point – epoxy is used; County purchases a proper steel bender.
- County Judge's office was aware of call from AHTD, but unclear when they became aware.

Key Dates

- Thanksgiving 2014: Braswell letter sent to Quorum Court and County Judge.

The bridge under construction, on County Road 64, is not being built per plans.

1. Bent rebar dowels in the footings were replaced with straight dowels.
2. Bent rebar in footings were repalced with straight bars.
3. Rebar mats have not been installed per plans.
4. Concrete footings have not been poured on a flat stable base.
5. Rebar lap is not being met.
6. Dowel bars are being installed in drilled 6 to 12 inch holes.
7. Rebar is being cut, heated and bent with a torch.
8. 130 yards of concrete was poured in a footing, that by plans, should have taken 60 yards.
9. Osha safety standards are not being met.

The bridge on County Rd. 195 was built in a similar way.

Key Dates

- Dec. 19, 2014: Braswell suit filed outlining concerns again.
- Dec. 19, 2014: JP Sue Madison writes the County Judge asking for a report on her investigation.
- Dec. 29, 2014: County Judge assures Quorum Court bridges are safe and her investigation is ongoing.

Response

- No investigation was conducted after AHTD's call or George Braswell's letter or lawsuit.
- In October, County Judge's office was busy with the budget and the election.
- In November/December, County Judge's office attributed the complaints to "politics."
- Superintendent and Asst. Superintendent said the bridges were safe, although crews had not been interviewed.

Response

- In the past two years, there have been no investigations concerning the Road Department. This investigation is the first investigation into any of the allegations concerning the bridges or the work environment at the Road Department.

Response

- Meeting held on March 18 or 19, 2015, after video was produced in the Braswell lawsuit.
- Based on the video, County's engineer recommends piers at Stonewall be torn down and weight limit on Harvey Dowell reduced to 3 tons.
- Engineer has drawn plans for revisions at both Stonewall and Harvey Dowell.

Question 3: Work Environment

- Regarding the Road Department, does the work environment create a culture where it is permissible to deviate from written instructions, like engineering plans?
- Answer: *Yes.*

Question 3: Work Environment

- *Witnesses were unaware of any written policies or procedures specific to the Road Department that must be followed. This creates, among other things, uncertainty.*
- *Engineering plans were referred to as "guidelines."*
- *There is an attitude that the County is the County and can do whatever it wants, that the County is "exempt."*
- *"Don't ask questions."*

Examples

- Smoking/tobacco ordinance, which was recently revised by the Quorum Court, is openly violated by Road Department employees.
- Dump trucks are overloaded, in excess of weight limits.
- The promotion/job application/interview process is a mystery and leaves employees feeling excluded and frustrated.

Safety

- Despite having regular safety meetings and being regarded as having a top safety program among area Road Departments, safety is not a priority.
- PPE (Personal Protective Equipment) is worn infrequently: hard hats occasionally, safety glasses rarely, steel-toed boots rarely, safety harnesses occasionally.

Safety

- Employees reported wearing hard hats only when a crane is being operated.

Safety

- October complaint to Arkansas Dep't of Labor concerned a vertical earthen wall that had not been benched or sloped due to nearby gas line at Stonewall site.
- Employees were concerned about working near wall for fear of a collapse.
- After complaint, gas line was located, a tree was removed (which fell on installed rebar in the process), and the wall was sloped.

Safety

- Concerns with improper traffic control and flagging
- No known safety officer
- Safety harnesses (fall protection) used incorrectly on occasion.
- Workers reported having to wear their harness on the bridge deck and use a torch to burn a hole in the steel so they could attach their harness.

Safety

State project shows use of harness system

Safety

One worker wearing fall protection at Harvey Dowell

Question 4: Work Environment

- Regarding the Road Department, does the work environment create a culture where workers are afraid to raise legitimate concerns through their chain of command?
- Answer: *Yes and no. There are clearly two "sides" to the Road Department – a group that likes and is comfortable with management and a group that fears retribution.*

Question 4: Work Environment

- *Example: Complaint made regarding policy violation. Complaining employee was called into a meeting with several supervisors AND the employee about whom he had complained. Reference was made to "snitching."*

Question 4: Work Environment

- *Workers feel like they have witnessed retaliation against their fellow workers: If you complain, you get the "crap jobs."*
- *Concerns regarding favoritism and out-of-work friendships affecting the workplace.*
- *Workers reported feeling bullied and threatened by management.*
- *Attitude from management: "My way or the highway"*
- *Comments about "breaking" employees*

Question 4: Work Environment

- *Workers need their jobs and do not feel secure complaining in an environment like this.*
- *Concerns about lack of an "open door" policy at the County Judge's office, whether complaining at that level will do any good, and fear of retaliation if you do.*

Current Work Environment

- Very stressful with lawsuits and media attention
- Virtually no communication with employees about the bridges or the related issues in recent months
- Employees take pride in their work (even if done incorrectly due to lack of knowledge and training), so there is resentment about the demolition and the comments about their work.

Additional Follow-Up

- Further investigation of the Road Department work environment is warranted.
- Concerns were expressed about:
  - Job postings, promotions, and interviewing process
  - Racial and discriminatory remarks
  - Profanity/abusive language
  - Favoritism and cliques
  - Work ethic and efficiency (with time and resources)
  - Compliance
  - Safety
- Employees suggested we interview ALL Road Department employees to get an accurate picture, but that is beyond the subject matter and time scope of our investigation.

Bridge Investigation Report

May 5, 2015

Russell Hill, County Assessor
Eva Madison, Justice of the Peace
Carl Gales, Technical Advisor/Citizen