

10:00 A.M. Monday June 11th, 2018 – Mont-Tremblant, Quebec

Present:

Kevin Williams (Chair)	Atlantic	Stan Lipkowski	ArcelorMittal
Jason Sherwood	Atlantic	Dave Watson	Leland
Heba Ahmed	Armtec	Mike Mounts	Valfilm
Bruce Matheson	Frontier	Todd Gray	ACI
Byron Nelson	Leland	Robbert Kamphorst	Bergschenhoek
David Newbigging	ArcelorMittal	Ray Wilcock	CSPI

Absent:

Nick Spence	Atlantic	Ian Berry	Warner
Riley Wilson	Atlantic	Shane Setter	Ironside
Phil Carroll	Atlantic	Jim Evans	AK Steel
Kamran Derayeh	ArcelorMittal	Marc Warden	Hubbell

1. Welcome and Opening Remarks

Kevin Williams opened the meeting at 10:00 a.m. and welcomed everyone. Attendance was taken and is recorded above.

2. Review Minutes from May 25th, 2018

Minutes were reviewed and a motion for approval was made by **Heba Ahmed**, second by **Jason Sherwood**.

3. Outstanding Items to Complete

a) Bolt & Nut Research

MTQ acceptance request update

1. Ray: Spoke with Gerard Desgagne in Ottawa at the SSC TAC meeting. He stated that he will meet with his staff later this year to discuss the proposal.

➤ Will continue to follow up with MTQ throughout the year

b) Rehabilitation Gap Analysis Literature Review

MTO issues requiring rehabilitation brought up at the 2017 buried bridge presentation:

- Flattening of the crown
- Seam openings – pull apart
- Haunches buckling – invert rising
- Crimping of the conduit walls (along the wall haunches)
- Bolt hole tears
- Excessive deformation of the conduit especially along the crown and shoulders
- Water leakage along plate seams and through bolt holes
- Corrosion and cross section losses (difficult to quantify and repair)

1. Objective is to produce a 3rd party white paper for DOT's and consultants on rehabilitation techniques to address above noted issues.
2. Provided information to Queen's (financial statements and proof of CSPI being a non-profit organization).

➤ Provide information for Mitac's application prior to end of June.

c) MTO – Structural Plate Standards Advancement

1. Package was submitted digitally to Tony Merlo and Magdy Meleka on February 22nd. Spoke with Tony Merlo in April at the SSC TAC meeting in Ottawa. He stated that Magdy & he will review our request this year.

➤ Will continue to follow up throughout the year

d) Municipalities Standards Submission:

1. Application and supporting documents were put together to target 10 municipalities. Thus far, St. John's and Halifax have been submitted. Plan is to submit the other eight in June / July / August time frame.
2. Kamran: Leed information is correct and can be added to tech bulletin on recycled content

➤ Ray to update CSPI tech bulletin on recycled content to incorporate LEED information.

e) Galvalume – report from Pete Ault

Pete responded to the committee's questions on Draft 3 as follows:

1. **Line Charts** - Figures seem conservative based on environmental limits which are the same or better than AL2. In the line charts, you have given 1.2 times Galvanized service life, however in the bar charts, Galvalume shows the same or better than AL2. Should the line charts not show at a minimum the same as AL2? Please define if it is possible to get figures the same as AL2 or not?

Response:

I do not clearly understand what the question envisions the line charts would look like, but I do not believe the line charts should be the same as AL2. The bar charts and line charts represent different concepts. The bar charts in section 4.1 are intended to determine if a material is appropriate for a given environment. The line charts in section 3.4 are to determine what materials will provide a specific estimated service life in a given environment. Two materials may be appropriate for a given environment yet provide a different service life in that environment. For example, Figures 7 and 8 shows that AL2 and galvanized are both appropriate in environments with a resistivity between 2,000 and 8,000 ohm-cm and pH between 6 and 9. However Figure 4.1 shows that galvanized is not estimated to provide a 100-yr service life at resistivities below 3,000 ohm-cm or pH below 7.2 despite being acceptable for those environments.

2. **Top of Page 6 Hardness** - There is confusion in this area and may be misleading. You state the following:

“After 24 wetting cycles spanning 260 days, a similar amount of rust specks and staining were observed on the Galvalume and galvanized samples. Aluminized Type 2 exhibited slightly more rust speck that the other two materials.

Based on this data and the performance observed in high chloride water (discussed below), the acceptable hardness range for 55Al-Zn can be same as for Aluminized Type 2 steel”.

CSPI understands the conservative estimate; however, it may be interpreted incorrectly. Could you please change the wording to make it clearer?

Response:

I propose the following change:

Based on this data and the performance observed in high chloride water (discussed below), the acceptable hardness range for 55Al-Zn does not appear sensitive to soft waters and is suitable for any water hardness. can be same as for Aluminized Type 2 steel.

3. **Electrochemical Testing** - Please outline the laboratory test you have in mind? Is there a specific test or standard we should be following?

Response:

The electrochemical studies would explore the hypothesized interaction of zinc and aluminum to protect the steel. By exposing individual zinc, aluminum, and steel electrodes in waters of varying chemistry and monitoring the current interchange and electrochemical potentials, we can simulate the behavior of 55Al-Zn in natural waters. Then we can answer questions such as whether (or when) zinc is protecting aluminum (and vice-versa), the consumption rate of the anodic material, and whether there are synergistic effects (e.g., passivation of the coating). I am proposing investigative testing rather than a standardized test. We have done similar work to explore the protection mechanisms of zinc rich coatings.

Notionally, I initially envision performing tests in three solutions – perhaps artificial seawater, tap water, and high purity water. Electrodes representing the appropriate relative surface

area of zinc, steel, and aluminum would be exposed in the solutions and their electrochemical interaction monitored. Coupons of galvalume coated steel would also be exposed as a reference surface. The electrochemical potential, polarization resistance, and final metal loss of the control coupons would be monitored for comparison to the interaction of the individual electrodes. If the TAC is interested, I will develop a detailed testing approach. The goal would be to enhance the credibility of long-term service life predictions by developing a better understanding of the degradation mechanisms.

4. **Site inspections** – In your opinion, will the “PosiTector” thickness gauge readings equal coupon testing?

Response:

While the “PosiTector” gauge readings will ultimately prove valuable, I do not believe that they are sensitive enough to provide good data in a relatively short period of time. In a field situation, the PosiTector will probably detect uniform coating loss on the order of several microns. For a 100-year coating life, a coating loss rate on the order of a few tenths of a micron per year would be expected. At these rates, it will take 10-20 years for the PosiTector to provide sufficient quantitative data to project a service life.

By closely looking at the test coupons, subtler early indications of corrosion can be identified; small areas of pitting and coating breakdown as well as much lower corrosion rates can be detected. The coupons can be removed for microscopic analysis before and after cleaning, and the coating loss can be determined from changes in mass. Once testing is completed and the test coupons are cleaned, the surface morphology can be microscopically examined, helping to understand the synergistic behavior of the zinc and aluminum phases. This will facilitate a better understanding of the degradation mechanisms which in turn allows a more meaningful life projection to be made with short-term performance data.

Kamran sent in the following comments:

I would like Pete to develop a detailed lab testing approach since the results could enhance the credibility of long-term service life predictions by developing a better understanding of the degradation mechanisms as suggested by him.

Please also decide if you want us to do the test or use a third party?

Site inspection: I suggest you do both, PosiTector and coupons. Please ask him where exactly he wants the samples taken? Also, please also decide if you want us (AMD) to do the analysis or third party?

I recommend not adding the lines at this point till we have a better understanding after the lab test and site inspection and ask Pete again depending on the results.

Committee Discussion / Decisions:

1. It was agreed that any future testing of Galvalume would be done by AMD and have a 3rd party do Q.A. on the testing.
2. There was discussion on the competitiveness of pricing of Galvalume versus Aluminized. Jason stated that the prices quoted from AMD were not competitive. Dave Newbigging will address with member companies.

3. The #1 issue is the size range is limited. Dave stated that AMD is not able to make 2.8mm or 3.5mm. Dave asked the committee if Galvalume might replace G90 (coating thickness designation)? Bruce stated that there is more demand for these gauges than 1.6mm or 2.0mm when selling aluminized material. Heba stated that no additional \$ should be spent with Elzly until it is determined that galvalume is a commercially accepted material in the market place.

It was agreed as follows:

1. The Elzly report is still not acceptable to CSPI.
2. Additional Technical information (sites) and lab tests are required.
3. There remain outstanding commercial questions which need to be answered such as pricing.
4. No additional cost to be spent until the committee meets and addresses the outstanding issues.

f) OPSD Height of Cover Tables – revisions required

Detailed double-stamped calculations for Round CSP 805.010, CSP Pipe Arch 805.020, Spiral Rib Round Pipe 805.030 & Spiral Rib Pipe Arch 805.040 were sent on May 30th.

Outstanding issues from OPSD are as follows:

1. The HoF values have not changed for OPSD 805.010, 805.030, and 805.040 despite the revision to design parameters.
 - a. ACTION REQUIRED: Please explain why no changes. Please keep in mind that other industries did make changes based on the new criteria.
2. It appears that the compaction of 85% was used to establish the K-factor, rather than 95% as specified in OPSS.MUNI 501. This was identified clearly in a note on OPSD 805.010.
 - a. ACTION REQUIRED: Please ensure that all calculations are in accordance with OPS standards.
3. It appears that your calculations are based on two trucks instead of two axle load (280 kN) as per the design criteria agreed to in Milestone #3.
 - a. ACTION REQUIRED: Please revise and re-submit calculations.

➤ Kevin to address 805.010 & 805.020

➤ Heba to address 805.030 & 805.040

➤ Send revisions to OPSD by required date of Friday, June 29th.

g) Sustainability (EPD)

Stan gave a presentation on the new CSPI EPD. Discussion ensued:

1. Kevin asked if the EPD is applicable to SPCS. Stan indicated it covers both CSP & SPCS.
2. All agreed that comparing to concrete pipe using all gauges would be our next step.
3. Robbert stated that in the Netherlands, EPD's are required for all materials in order to bid government projects.
4. Bruce would like to be able to compare versus HDPE. He asked if ADS have an EPD? Stan did not know if there are any EPD's out there for HDPE pipe. Research required.
5. Stan stated there are 3 pillars of sustainability. Economical, Social and Environment.
6. All agreed that CSPI should post the EPD to the website and announce using E-Blast.

➤ Post to the website and E-blast in July to all readers in the data base.

➤ Ray to work with Stan on comparisons versus concrete pipe and HDPE pipe if available in the 3rd Q.

h) NCSPA Polymer Coated Plate & Bolt Testing

Ray reported upon the meeting held on June 5th:

1. Pete Ault sent a draft to Mike McGough in the first week of June. Mike will review and share with all committee members.
2. Committee is reviewing Ian Berry's comments
3. A meeting will be planned for the sub-committee in July
4. The ballot is forthcoming once the issues are addressed
5. The current wording needs to be cleaned up and then will be distributed to the entire TAC committee

4. Long Term Items

a) ASTM A742 Review & Testing

Mike: gave an update on latest discussion from the NCSPA sub-committee. The specification is up for review (every 5 years). It was decided to proceed with minor modifications, such as test methods that are no longer active, wording, references, etc. to move this specification out of the 5-year review. In the longer term, the more detailed topics and major modifications (salt spray testing, e.g.) will be tackled. The ballot will be circulated to the sub-committee prior to submitting to ASTM.

➤ Mike to include Kevin & Ian on the distribution list.

b) Storm / Buried Bridge Action items – update

Feedback from DOTS and Municipalities:

The five items as voted on by the committee at the December meeting were:

1. Municipalities – focus on standards for storm sewers and culverts
2. Education on durability / coatings available

3. Education on proper installation and manufacturing of polymer
4. Analysis for PEI DOT – bringing backfill in from N.B. (plate versus concrete envelopes)
5. a) Full review of the of the DGSSMS
b) Technical bulletin on alternatives to granular backfill

Update from Ray:

NF DOT – submitted changes to their storm sewer, culvert and bridge standards to include polymer laminated CSP and polymer coated SP. John Morrissey sent a note saying they received and will be in touch this year.

Sask DOT – submitted comments to a new standard calling for culvert stiffener specification.

BC MOT / University of BC – met with both parties and both were positive on the LCC analysis on buried bridges versus traditional bridges on the Coquihalla highway. Follow up meetings to be set up in August / September time frame.

Road Authority in Ontario – CSPI is now a member and will be able to submit product applications to Municipalities in Ontario.

c) Thermopolymer plate in brackish/salt water - Ray

There are three sites requiring a review (1 in BC, PQ & NS). MTQ are extremely interested in these sites as this is their number one concern.

- Ray will visit during 2018 summer and fall travel and will report back by the end of the year.

d) Technical Bulletin on Invert Reline - Ray

- Ray to draft a technical bulletin using the article from Sweden in 2018 by 3rd Q, to be reviewed at a future TAC meeting.

e) Winter Storage Technical Bulletin

Phil sent a draft in April. Ray to make comments and will then circulate to committee prior to the next meeting for review. Target October release.

f) Bolt & Nut Research

Estimated material service life (Pete Ault quote)

Higher abrasion resistant coatings (Leland lead)

1. Byron: the new resistant coatings are being worked on – hope to be ready by the 3rd Q. Zinc flake coatings are in ASTM A325 and Leland is current working towards a ballot within 6 months to have them included in A490. Asked if CSPI will endorse NZF 3000 over mechanical galvanized bolts as NZF have tested superior in both corrosion and abrasion.
 2. Dave: stated that by once the bolts are in A490, they will be covered in A449 – culvert bolts.
 3. Ray: stated that despite NZF being superior than mechanical galvanized bolts, the latter is in CSA G401, Section 4.4.2.4. Suggested that in parallel with ASTM submission, work towards CSA specification that is up for review and publication in 2019.
- Kevin: directed CSPI to work with Leland to include NZF3000 for CSA G401 inclusion.

5. Ongoing Items

a) Kleskun Hills 5 Year Project

August 10th 2017 report approved and submitted to Alberta Transportation

➤ Next site visit in August 2018

b) ASTM

Mike gave an update above on A742. No other updates were reported.

c) NCSPA

At the June 5th meeting Mike McGough mentioned that AASHTO M246 requires a revision and update.

d) TRB

Kevin: no update

e) CSA G401

CSA G401 Revisions List thus far:

5.1.3 Helical Lockseam CSP – for 1.1 change the diameter to a range (100mm – 3600mm) and tables 10 and 11 to standard sizes.

5.1.3.8 Welding of Coil Ends – wording required to address the reference to CSA W59 and its reference to CSA W47.1 certification requirement.

6.1 Quality of Work – (f) refers to defective welds (as defined in CSA W59) – thus the reference back to butt welds. We need to define certified welding between CSP & SPCS.

6.2.1 Repair of damaged metallic coating – references CAN/CGSB-1.181 which was withdrawn in October 2011. The equivalent standard is ASTM A760 which references A780 for repair.

Table 1 Chemical Composition of Steel – exceeds AASHTO M218 total composition cannot exceed 0.70. S/B updated for compliance.

Table 18 Minimum Coupler Dimensions – breakout corrugated and semi-corrugated couplers (very confusing). Semi corrugated 600mm couplers – does anyone manufacture this in Canada? In addition, identify that 600mm diameter refers to 5 bolts (can be interpreted incorrectly).

Other:

1. AASHTO M218 lists mechanical requirements of coil prior to fabrication
 - Tensile – 310 MPa minimum
 - Yield – 230 MPa minimum
 - Elongation in 50mm – 20% minimumG401 does not have a mechanical properties requirement for CSP material.
 2. Welded lockseams for the North – permafrost
 3. Markings – on both sides / logos versus names?
 4. Polymer Laminated Repair – Denso 35 (A762)?
 5. Bolts – include NZF3000
 6. Bruce mentioned saw cuts / repairs
- Ray to mock up standard and send to committee for review – 3rd Q 2018
- Submit to CSA for costing & review

f) AREMA

No update from NCSPA.

g) CSCC (Canadian Steel Construction Council)

Ray: no update

h) AISI 2019 Projects Submission Ideas

1. Polymer Laminated Steel	10,000
2. CSA Certification Programs	10,000
3. University Outreach Program	5,000
4. Galvalume Project	5,000
5. Floodnet	1,000
6. CSA G401 update for 2020	10,000
7. Rehabilitation Technical Bulletin	5,000
8. EPD – Benchmarking	10,000
9. Life cycle comparison - BC	5,000

Total **\$61,000**

Kevin suggested funding for elimination of re-corrugated ends and municipal standards effort. [Move to L/T items for next meeting.](#)

- [Ray to present 2017/2018 results on June 20th in Washington](#)
- [Ray to present requests for 2019 funding on August 30th in Washington. Committee members to submit ideas.](#)

6. Discussion / New Business

Calculators on the website (from last meeting):

1. Ray: the resistivity calculator is giving out conservative results versus laboratory testing. This may lead to an incorrect decision with regards to material selection. Although a tool for guidance, it can be used verbatim. Manning's flow and culvert length are other calculators available for upload.
 2. Nick: recommended taking the resistivity calculator off the site or adding disclaimers for all tools. Suggestions included adding links to tech bulletins/white papers/handbook etc. and reference all calculators to validate their authenticity.
- [Nick & Ray will work together on this area and address by the 3rd Q.](#)

7. Adjourn & Next Meeting

The meeting was adjourned at **11:50am**. Next meeting at the call of the Chair.

Secretary
Ray Wilcock