STAC – Engineering Guidelines and Practices:
Pinwheel Fall Arrest Team Meeting Notes
Meeting: September 7, 2016; 11:00 a.m.-12:00 p.m.

Action items:

- Team members to send to Nick any photos they have that show obstacles/blockages on the way out to the end of the boom
- Clay to develop list of correct equipment to be used in each access procedure outlined
- Clay, Gord and Nick to develop access procedures for different scenarios workers might encounter when trying to get out to the end of the boom (including getting around obstructions) and to identify proper equipment to be used during in each case
    - Team members to help identify scenarios for which access procedures are required

Attendees:

- Nick Kyonka (STAC)
- Jonathan Walsh (TEI)
- Ali Raja (Rogers)
- Asma Arefeen (Rogers)
- Blair Bittner (WesTower)
- Cesar Galvez (Telecon)
- Clay Parchewsky (WesTower)
- Jacques Bredenkamp (Nabatech)
- Jody Ali (Bell)
- Marina Guerra (Bell)
- Serge Arsenault (WSP)
- Trevor Bolt (Varcon)

Non-Member Attendee:

- Greg Small (Elevated Insight and Engineering)

Meeting Notes:

- Nick notes that the group decided at Pinwheel Fall Arrest team meeting in May to develop a document outlining current pinwheel access practices for different types of pinwheels
    - Notes that Gord and Clay have worked very hard on this document to get it to where it is now, which Nick previously shared with everyone here
    - This meeting to review that document and chart a path going forward
- Nick leads group through introductory part of document, including Intent, Goal, Field Workforce, Potential Issues, Questions
    - Notes that authors wanted readers to consider the stated questions while going through the document
- Nick notes that Fall Protection Anchorage Requirements are laid out in brief at the start of the booklet (Section 6), with the verbatim wording of federal and provincial requirements in Section 10
    - Notes that there is also information about Average and Maximum Arresting Force (Sec. 6)
- Nick notes that Section 9 provides photos and drawings of specific types of pinwheels and includes descriptions of how workers typically access antennas on those types of pinwheels. Some discussions from the team's review of Section 9 include:
    - Cesar says questions 2 and 3 in Section 9.1 are the main problem: how to get to end of the boom using only acceptable anchor points without creating the risk of extreme swing fall

- Clay says if boom is inadequate to properly tie off to, a worker would tie their sling around the mast pipe and connect your lanyard through the sling before moving horizontally out to the end of the boom
    - Work positioning lanyards can be used to reduce swing fall
        - If using proper equipment and proper connections, there should be very low risk of swing fall
        - Swing fall risk returns when positioning device is disconnected
    - Says this is the best way to do it right now, but it isn't followed all the time
        - Some workers tie off to the end of the boom
    - Jody notes that some booms extend further than 6' from the tower, maxing out most y-lanyards
        - Clay notes that if you add a 4' tie-off link around the mast pipe, you get two more feet
        - Clay says it is a solution to connect multiple lanyards
        - Greg says Safety Direct can manufacture custom lanyards that are designed to CSA standards
    - Clay says once you are out to the end of the boom, you can also use other fall protection equipment like a self-retracting device (SRD) to reduce swing fall and arrest fall immediately
        - Greg says that if you use the right type of SRD, the fall is arrested immediately and thus reduces the arresting force that the anchorage point is subject to
            - Says most Type-1 SRDs will only limit fall if positioned above the worker, which is not always possible on pinwheels
            - Very important to get right type of SRD with proper breaking mechanism
    - Greg says that dual-connection is an option as well: worker will have two SRLs or the right "twin-leg" SRL
        - Connect to the mast and to the end of the boom and would be able to walk back and forth between two points
            - If you fall, one of the two connections will lock off and will start a swing, but then the other locks off to prevent that swing fall
        - Cesar asks if you go all the way out on a longer boom (10' or so), will you be able to meet the 17.8 kN because not every worker will have two sets of lanyards
            - Greg says that if you choose the right equipment, you will definitely be well under the 17.8 kN
        - Jacques notes that when using two devices to reduce swing fall, there will be two occasions where major swing fall risk still occurs: when first walking out to the end of the boom to tie off, and while moving back to tower after disconnecting positioning device
            - Greg agrees, and says carabiners or a short lanyard could be used along the top beam
                - Clay says this compares to a bypass belt/pole strap that is used to get past an obstruction

- Clay says question now is whether to address anchorages and anchorage requirements, or to promote best practices using available equipment under current conditions
    - Just needs a pole strap, a y-lanyard
    - Trevor asks if this document could include a list of the types of equipment that should be used to get out to the end of a boom, even if it's 10' out
        - General agreement
        - Clay says if he had to go out 10-12' on a boom, he would basket a 6' sling, put his 6' y-lanyard on there and attach his pole strap to the boom
            - Won't want to tie on the end, but that will create swing fall
            - Greg notes that vertical movement while out on the boom is not significant
                - So if you "short-coupled" with something (SRL, short lanyard), you're not setting yourself up for much of a vertical freefall
                - Ie: if standing on bottom beam and connected via a 3' lanyard to your dorsal, you're looking at a 5.5' vertical freefall into the top cord
                - Some people might choose to connect to their hips (ie: both legs of a y-lanyard connected to hips with the third leg connected to the anchor)
                - This would be "travel restrict" but must have a freefall of 2' or less
- Clay says worst cases out there see a worker hook a y-lanyard on a sling onto the horizontal pipe at the top of a tower, puts their arm on the boom and walks out
    - Cesar says that if a contractor does this and there is an accident then there will be liability issues: question is how to ensure that workers are following correct practices
- Clay points to Maximum Arresting Force chart as "worst-case scenario," notes that moment of force is so brief that the booms should be able to handle it
    - Greg notes that an engineer still needs to sign off on the tower and anchorage points being safe
        - Says he believes 1800 lbs of force is more than necessary, as it is designed for average user and not an engineer
            - E4 energy absorber is not allowed to peak at more than 900 lbs unless wet and frozen, so if you control when you climb towers to ensure this isn't the case, you could easily engineer for 900 lbs with a factor of safety for two
                - Could also reduce force on E6 as well
            - Notes that we are talking about dynamic loads: notes that people thought for many years that man-lifts could tip in fall situations, but have since realized that the arresting force is over before a man-lift would actually get into a position where it would tip
                - Result is that boom bounces back and fall is arrested
                - Should approach anchorage on towers in same way
- Greg says role of engineers is to make sure that towers are safe and work properly

        - Regulators can't charge an engineer for not meeting letter of regulations unless they can show that the engineer was doing something dangerous
            - This is called a *de minimis violation* in US when regulators can't certify that what was done is actually dangerous
            - If you know what you're doing, you can get away with much weaker anchorages than what regulations call for
                - This is big part of purpose of CSA Z259.16 standard is to provide engineers with tools, criteria and due diligence backing they can point to as an accepted standard they have followed
    - Nick asks what this all means for existing pinwheels that aren't currently engineered to withstand 17.8 kN of force: is there a simple process through which you can determine whether it has a safe anchorage point?
        - Greg says we need to prove that those towers are strong enough for the purposes we need them for:
            - Can be done through calculation or testing
            - Says codes themselves are somewhat conservative (usually can get 30% more strength than calculated, sometimes even more)
                - Says that he starts out calculating and if the calculations show that it clearly won't work, then that's the conclusion: if they show it's a "little iffy but fairly close" then field tests should be used
                - Jacques says he has found this to be the case as well
                - Says he's not sure as to whether there is still a question as to what load we should be aiming for
                - Notes that a higher number doesn't leave any gaps
    - Jacques says he believes testing will find that anchor points are probably mostly ok, but the bigger issue will be accessibility for maintenance work
        - Notes that there are ROUs sitting on side of a boom, so how do you get out to the antenna
            - Says we can create rules for riggers and engineers to say provide limits
        - Greg notes that not all pinwheels are at the top of the tower, so one thing you can do to reduce swing fall is to make workers tie up a little higher to anchor
            - Notes there are legal limits to swing falls in some provinces and in CSA Z259.16
                - Where designing a system, elevation drop in a swing must be less than 4'
                - Is a difficult problem when you're 10' out on the arm, because this can easily lead to a greater drop-swing distance where a worker will could swing into a tower at a high velocity
        - Greg says he agrees that safely accessing the end of an arm is a key problem
    - Greg says he expects that strength of most booms will be acceptable once checked
        - Jacques agrees, says he thinks they should be checked to 4,000 lbs.
        - Team member asks why industry would check for 4,000 lbs when maximum arresting force is 1,800 lbs.
            - Jacques notes there could be two riggers on a mount and it is possible that something could cause them to fall at the same time

- Greg notes that you cannot assume that because an energy absorber deploys at 4 kN that this is the maximum force you can see
    - Too much freefall or two heavy of a worker can bottom-out an energy absorber
        - This is one reason why identifying the correct equipment is so important

- Marina says she believes next steps are to figure out exactly what are the *correct* practices for accessing the pinwheel
    - Can then figure out how much force they should be able to apply and where on the tower it must be applied
        - Greg says worst location will be between panel points on a pinwheel (ie: top member)
            - Question is what impact will top member sustain before it bends if someone is on the middle of it
            - Marina agrees

- Nick says next steps include listing correct equipment to use in the Access Procedure practices as outlined
    - Jacques says it would also be useful to identify situations where ROUs can make it difficult to access the end of the antenna
        - Says he thinks there should be regulations around ensuring there is a safe path to the end position
        - Says another issue related to when you have an antenna hanging below a member: should have rules for how to access
        - Notes that the document we have so far is extremely valuable and is a good start
            - Greg notes that people on the cover of this document seem to be doing rope access
                - Requires a lot of training, but gives riggers ability to do much more
                - Trains workers to figure out for themselves how to safely access a structure
    - Nick asks that anyone who has photos showing obstacles/blockages on the way out to the end of the boom to please send photos to him
    - Clay says he can set out the list of correct equipment to use in each access procedure
        - Says he can also do different access scenarios using different equipment