**MPCA INFILTRATION TECH TEAM MEETING**

**June 22, 2016**

**9:00AM - 11:30AM**

Attendees: Greg Wilson, Michelle Kimble, Matt Kumka and Heather Hlavaty from Barr Engineering

Others: Mike Findorff, Mike Trojan, Forrest Kelley, Randy Neprash, David Fairbairn, Joe Mulcahy, Jim Hafner, Mike Isensee

1. Mike Trojan is requesting a contract extension to July 31, 2016. If it is not accepted, all work needs to be done by June 30, 2016.
2. Task D
   1. We will want to link to any information on soil borings in other places in the manual to a page specifically for soil borings. An example is the page called [Screening assessment for contamination at potential stormwater infiltration sites](http://stormwater.pca.state.mn.us/index.php/Screening_assessment_for_contamination_at_potential_stormwater_infiltration_sites).
   2. Soil borings should be HIGHLY RECOMMENDED, soil exploration is required in the manual, but that does not necessarily need to be a soil boring.
   3. Drawdown testing before being signed off should be HIGHLY RECOMMENDED
   4. Provide detail on how to order a soil boring including:
      1. If soil boring auger goes to refusal prior to depth desired, drill in another location
      2. Request soil boring sample recovery include the most limiting soil encountered – clay, then silt, then sand.
         1. Are there thresholds for recovery as it relates to identifying restrictive layers?
      3. Make sure driller knows why the borings are being conducted.
      4. Instruct drilling company that you want all the drillers notes from onsite
      5. Recommend a standard soil boring form, check the standard form Wisconsin uses
         1. [Wisconsin has a standard form](http://dnr.wi.gov/topic/groundwater/documents/forms/4400_122.pdf).
         2. Should run this past geotechnical firms that probably have their own forms
      6. Provide guidance to drillers in helping identify restrictive layers, including when to use a geotechnical engineer.
   5. Add recommended, highly recommended, and required to text. Explain the risks associated with cutting corners.
   6. Add that it is highly recommended historical records are investigated for the site. Soils could contain contamination, layers of debris, etc. Expectation of variability based on site history. History of site could impact the number of soil borings recommended.
   7. Decompaction should be required. Is it in the stormwater permit?
      1. At a minimum we want to link to information on preventing compaction during construction.
   8. One concern was that often fill is brought in to build homes on, and there are rainwater gardens in every other lot. Should the fill need to allow for infiltration? Not stated anywhere in the permit.
3. Task C
   1. Link to a soil boring page, make sure task C notes match soil boring requirements/recommendations
      1. Soil boring recommendations, depth, spacing, etc.
   2. Look over task C notes/bioretention page about soil boring recommendations
   3. Subtask 1
      1. BOLD all references to required drawdown time of 48 hrs.
      2. Infiltration basin: New ordinances for MS4 permit that say water quality volume must drawdown, but don’t talk about the remaining stored volume (if basin is significantly deeper). All stored volume must drain within 48 hrs through bypass/overflow or drawdown
         1. MIDS has max depth of 4-6 ft?
      3. Bioinfiltration: Change max wet storage depth (Do in Figure for Subtask 5) to 1.5 ft. as a recommendation
         1. Is larger scale bioinfiltration possible?
            1. Access and maintenance would be easier
            2. May not want to have a recommendation for just a small scale basin (< 5 acres)
            3. Not much info that larger basins function property long term
            4. Smaller basins will mimic natural hydrology
            5. Bioinfiltration basins are throughout watershed, infiltration basin at the end of the watershed (larger)
         2. Most practices are small (rain gardens) and the manual should continue to focus on these systems, which are small, can be used throughout a watershed, and have a recommended 1.5 foot depth limitation.
      4. Underground Infiltration:
         1. 10 acres is small. Should contain a list of conditions which allow larger area. If provided adequate pretreatment, permeability, maintenance, etc. (could have 200 acres, 80 acres, etc.)
         2. There are some very large systems being put in (more than 50 acres). The larger systems have advantages in areas where it is difficult to utilize other BMPs. But including a larger size as the recommendation may encourage the larger systems in areas where the expertise in designing and constructing these is lacking. Although we have concerns with the larger practices (e.g. effects on groundwater quality), we don’t have the data to support recommending against building larger systems. For now we can keep the recommendation at 10 acres, acknowledge that larger systems are being built, and identify potential advantages and limitations of the larger systems, pointing out this is an area of on-going research.
         3. Example: Rosedale shopping center –
            1. May be a ratio question instead of max area.
            2. Wind, maintenance, UV, microbial degradation action of surface systems do not occur in UG infiltration. Maybe capping at 10 acres is good?
            3. CRWD comment: concerns about DA to basin ratio, if close to groundwater, more water loading to GW flow = could change groundwater contamination and flow.

Example: Upper Villa – cistern draining to infiltration chamber.

MDH has put wells, testing is on-going, analyzing metals, nutrients, microbial degradation

* + - 1. CRWD concern: if capping at 10 acres or less, people may not install BMPs for TMDL and WQ goals. Even if overflows are designed/bypassing large events. A variety of conditions should be applied to the 10 acre recommendation.
      2. “if building a larger system, consider ...”
         1. Could describe lack of performance research supporting recommendation for larger systems
         2. Disclaimer that under certain circumstances (LGU owned, operated, maintained)

Not exceeding max infiltration rate, 3 ft of separation to GW

* + 1. Permeable pavement
       1. Asphalt and concrete – short lifespan
       2. Pavers are always recommended: can be restored, replaced, vacuumed
       3. Permeable pavement – seeing increased incidence of failure in permeable asphalt and permeable concrete. Uncertain of the reasons for failure, but could be chemical and/or physical. The examples given suggest gradual clogging from the edges toward the center. The only article I found in the literature was related to raveling (See <https://trid.trb.org/view/2003/C/645893>). PICP appears to perform better, perhaps because it is easier to maintain and if necessary, replace. **Question – does the sizing recommendation apply to all permeable pavement, or should PICP differ from asphalt and concrete if it performs better?**
    2. Tree trench
       1. Example: Greenline tree trenches – what is the CDA per tree?
       2. Comment that 0.25 acre per tree contributing area seems small and seems to be based on data for tree boxes.
       3. Where larger root volume system are provided, we ought to allow/acknowledge using a larger CDA could be appropriate.
       4. Concern that this limit of 0.25 ac/tree will discourage constructing tree trenches
       5. Existing: 1,000 cf is a recommendation of soil for rooting volume
       6. Maplewood Mall: this is a good standard (0.25 acre average)
       7. Riverside Area Case Study: filtration, infiltration at riverside park
       8. Similar to bioretention but stored underground, would need to accommodate for 40% void verses 100% storage
       9. For a performance goal of 1 inch, 0.25 acres of impervious contributes about 900 cubic feet of water. Assuming a soil porosity of 0.50, this is 1800 cubic feet of soil per tree, which is above the recommended volume in the manual (1000 cf), even for large trees. So I (Mike Trojan) would argue that 0.25 acres is perhaps even at the upper end of what we should be recommending.
  1. Subtask 2:
     1. Filter fabric was no longer being recommended for BMPs – widely condemned
        1. Permeable pavement: separate rock from in-situ on sides
        2. Try to avoid placing filter fabric on bottom as much as possible
        3. Not wrapping perforated pipe or trench
        4. Change “enclose media” in filter fabric for infiltration basin to pertain only to the sides and not bottom
        5. MNDOT: spec Type I non-woven if used
        6. Too much talk about fabric.
           1. Add cautionary statement: “use with caution generally only on top and sides”
        7. **Link to construction practices and avoiding compaction/reversing compaction**
        8. Add high flow bypass row: Stormwater manual requirement that we have to bypass flow within 48 hrs
     2. Permeable Pavers:
        1. Recommend pavers instead of asphalt and concrete because of failure
           1. Decomposition of material could cause failure – bitumen clogging from melting/loading?
           2. Shoreview concrete: good to keep an eye on
           3. Noise of pavers in neighborhoods could be an issue
  2. Subtask 5
     1. Drawdown currently relates to only WQV but could include bounce.
     2. ALL water must get through in 48 hrs
     3. Some infiltration practices are being built both for water quality and for rate control. This can create problems for long-term performance of the infiltration practice. For example, large depths can compact underlying soil, decreasing the infiltration rate.
     4. Need to define:
        1. Depth of bounce
        2. Frequency of bounce
        3. Cfs through the basin
        4. Outlets: emergency, high flow, infiltration
     5. Can apply to underground infiltration and bioinfiltration (making sure to meet depth requirement for bioinfiltration)
     6. Look to see if other design constraints limit the bounce
     7. Check other manuals to see how bounce is defined
     8. Idea should be to make practice larger to decrease bounce
        1. One idea was to recommend limiting drawdown (including bounce) to the maximum depth that can infiltrate within 48 hours (e.g. 6.52 feet for GW, GP, GM, and SW soils).
           1. Depends on outlet structure and site infiltration rate of in-situ soils
  3. Subtask 4 & 6
     1. Mike wants all infiltration practice design criteria webpages to contain the same subsections as in bioretention
     2. Need to create a permeable pavement design step procedure

1. Maintenance
   1. Infiltration basin challenge: seeding should be made a separate item. Seeding is an issue which fails the most. It’s a challenge to get vegetation growing.
   2. Have a separate discussion for seeding in maintenance sections.
2. Construction
   1. Information on protection during construction
   2. Testing and certification before moving forward with a project (Mike F. mentioned a MN DOT spec)

**Summary of Items Above:**

1. **Task D:**
   1. Create a separate soil boring page for soil exploration requirements/recommendations
   2. Create a standard soil boring form (Wisconsin has one)
2. **Task C:**
   1. Bioinfiltration: should generally focus on small rain garden infiltration systems
   2. Underground Infiltration: stick to 10 acres, but have discussion on advantages and limitations of larger sizes, pointing out that this is an area of on-going research
   3. Permeable Pavement: Pavers are recommended over other types which often clog. **Question – does the sizing recommendation apply to all permeable pavement, or should PICP differ from asphalt and concrete if it performs better?**
   4. Tree Trench: 0.25 acr/tree is good, possibly even on the high end
   5. Media and Materials: table should discuss compaction and link to decompaction page
   6. Media and Materials: add high flow bypass
   7. Filter fabric: may not be recommended at all, at the least, it should NOT be used on bottom of practice
   8. Drawdown Figure:
      1. need to define depth of bounce, frequency of bounce, CFS through basin
      2. show outlets: emergency overflow, high flow bypass, infiltration
      3. Apply to underground infiltration and bioinfiltration (with 1.5 ft depth)
      4. Limit total depth to 6.52 ft
3. **Additional Items:**
   1. Need discussion on seeding in maintenance section
      1. Consider testing and certification for infiltration practices before moving forward with project
      2. Info on protection during construction