Appendix D-2

Innovative Revegetation Study
Task 4 Field Visit Observations

Date of Field Visit: 2/21/2014
Location: I-76 Brush
Site Visit Performed by: Western States Reclamation (Chelsea DeNoble)

Western States Reclamation (TerraLogic Team Member) attended a CDOT revegetation observation of the Eastern Plains Project. The main focus of the research based observation was for compliance to CDOT erosion control specifications and overall revegetation practices. Western States Reclamation observed field conditions and reviewed documentation relevant to revegetation actions. The following are the Revegetation QC observations and recommendations:

It was not possible to completely fill out the Innovative Revegetation QC Checklist since it would require time with the Project Erosion Control Specialist (ECS); the next meeting will be specific about revegetation issues and the checklist will be completed. The ECS and the revegetation contractor were not present but the Project Inspectors were in attendance along with the Region 4 Water Pollution Control Manager (Jennifer Gorek).

Basic Findings 2/21/14:

1) Organic amendment with N-P-K of 6-1-3 and humates were called out on the plans. All seeding prior to September 2013 received Biosol 7-2-1 and humates, after September the seeded areas received Sustane 8-2-4 and humates. Quantities were as called out on plans. *The Inspector stated there were issues with pricing and availability, which is why the contractor switched amendments. It is not clear if this decision was approved by the Project Engineer.* Amendments were applied via hydro truck and a dry spreader in various areas, depending on access.
2) Plantago tackifier was used as specified. The Inspector verified the 200 #/Acre application.
3) Seed mix was used as specified. Wetland mix was not used yet. The seed ticket for native seed mix matched the proposed mix. Both mixes have more than 110 seeds/SF, these could be reduced to 60-80 seeds/SF to lower costs.
4) Seed was drilled ¼-1/2 inch and verified by the Inspector. The Inspector monitored drill calibration, but did not provide written documentation of this.
5) One steep area was hydroseeded, hydromulched, and then blanketed in 2013 (June?). This was the only way the area could be accessed, so CDOT approved the hydro-work. Vegetative growth was great here, partially due to large amounts of precipitation in the summer of 2013. (Note: Inspector made contractor hydro mulch as the erosion control blanket crew could not arrive until 2 days after seeding).
6) Topsoil was windrowed where existing, i.e. pushed aside into a linear pile (not stockpiled). This was not a line item in the contract, but the contractor salvaged topsoil where possible anyways*. It is not clear where the topsoil was salvaged*, but the Inspectors verbally verified that the contractor did their best to salvage existing topsoil.
7) Straw mulch was applied at the proper rate, 2 tons/acre. Straw was certified weed-free from Colorado. The straw stockpile was verified for straw length; the length was over 10" and

looked fresh. Inspector mentioned that the contractor had trouble crimping, straw coming out of the blower had been chopped up into short lengths (approx 4") and would not crimp well. We visited a site that had been straw mulched and crimped; this area had a great crimp. The day we visited was very windy, but straw remained in place.

8) Slopes are very sandy off of I-76. In one area, the general contractor is planning on mixing clay from another area of the project with the sandy slopes as a sort of experiment to see if this will aid in plant growth. CDOT likes this idea, and the contractor is performing the work at their own expense.
9) One problem brought up by CDOT (not project specific) was the note in the SWMP section of the plans about re-seeding. CDOT feels that contractors are taking advantage of the note that states CDOT will pay contractor to seed a second time if after one growing season there is no growth. CDOT feels contractors are not doing a proper job the first time so that they get paid a second time. It is my understanding that this re-seeding payment was due to issues with weather or topsoil and not contractor performance. An additional note states the contractor will redo any work as necessary that are identified during daily inspections. Site should not be accepted and signed off upon if contractor performance is an issue. Regardless, CDOT wants these notes edited to be clearer.
10) Overall, the site looked great and it seemed everyone was doing what they were supposed to. The inspection team had done a great job holding the contractor accountable and making sure they did everything correctly, and used good product.
11) It is noted that the ECS was not on site for this revegetation field study; however, an Inspector was present and appeared to answer erosion control/revegetation questions. The duties and responsibilities of the inspector are not known and it is not know if the Inspector is a certified ECS.

Appendix A: Site Photos

Figure 1. Area hydro seeded, hydro mulched, and blanketed. This is one year's growth (2013) on steep, sandy slopes.

Figure 2. Hydro seeded area. Heavy rains in 2013 breached berm at the side of the highway, causing some erosion in localized areas.

Figure 3. Straw mulched area. A good crimp led to zero loss on this windy day.

Figure 4. Straw mulched area. This side of the frontage road had been driven over by unknown vehicles. There was no evidence the area had been straw mulched.

Date of Field Visit: 2/21/2014

Location: Eastern Plains

Site Visit Performed by: Art Hirsch

TerraLogic visited the Eastern Plains Project in February, 2014. TerraLogic met with the Erosion Control Supervisor (ECS). The meeting was comprised of a discussion to complete the QC checklist, a conversation with the revegetation subcontractor, a brief site visit and field-soil sampling. The original intent of the visit was to observe seeding operations; however, the subcontractor decided not to seed and I was not alerted to the situation. The following summarizes the main observations and discussions:

Field Discussion

- The project is 6+ miles long and it appears that well over 30 acres of soil are exposed. 153 acres are estimated to be disturbed. The project is expanding ramps, replacing and installing 13 bridges and resurfacing with concrete.
- Vegetation is starting to establish from seeding done last year; see last visit report.
- No stockpiling of topsoil was performed at the site. Topsoil that was wind rowed is essentially topsoil that what scraped off a temporary equipment road along the interstate. Observation showed not real organic matter/top soil horizon. A sample of the wind rowed topsoil was taken and pictures taken in the field (see attached pictures).
- Hydroseeding was performed and is planned to be used in tight locations.
- Revegetation areas are not routinely monitoring after seeding for growth success; this is an area for revegetation improvement. Revegetation is usually the last thing done on the project just before the contactor leaves the site and signs the site over to CDOT Maintenance.
- I had a 30-minute conversation in the field with the revegetation contractor along with the ECS. The points that were mention are:
    - CDOT is directing contactor to temporarily stabilize areas via seeding and mulching without using soil amendments; many of these areas ultimately become permanent revegetation areas without the amendments. This results in spotty revegetation success in which the contactor is required to go back and reseed due to poor success. Amendments should be added to soil (in this case imported soil) regardless if it is going to be temporary or permanent.
    - Too much compost being required on this and other CDOT jobs; soil chemistry is important to know upfront of the project.
    - Contractor bid on the job assuming a completely linear revegetation job with minimal mobilizations; the construction approach requires revegetation contractor to mob/demob at a high frequency for temporary and permanent seeding. Contractor losing money on this issue.

    - Drill seeder is calibrated just before the project starts; I was told that it is documented but paper documentation is not given to CDOT since this is not a requirement.
    - At times it is difficult to meet the specification timeframe between seeding and mulching; at times winds pick up over 20 mph and they cannot mulch according to specification. Some flexibility in the specification is needed.
    - Seeding windows make sense but there needs to be some flexibility depending upon site conditions; June 1 is the latest that the project can seed according to specifications. The project may ask the PE to extend the seeding period.
    - Project is importing soil from adjacent area near staging area (picture); soil is essential "sterile" and needs amendments.
    - CDOT needs better weed control along the ROW near revegetation areas to promote better revegetation success in regards to noxious weed competition for water and establishment.
    - Revegetation contractor bonded and liable for revegetaton success 12 months after seeding.
- PE did not approve and inspect mulch bales; this was performed by the Atkins inspectors.

Checklist Observations

- ECS could not find the percent vegetative cover data and was not aware of who performed the measurements. Apparently CDOT has this information but not in the SWMP.
- No seed was available to test; the seed in the drill seeder could have come from another job. ECS offered to provide a sample for our testing.
- Tilling and amendment addition occurs in a train ahead of the drill seeder (not visually verified).
- ECS leverages off the Atkins inspectors who watch the subcontractor during seeding and for general erosion control actions.
- Design consultant developed the SWMP for ECS to follow/modify.
- TerraLogic was told that the Region 4 WQCM is present during some seeding operations.
- Crimper and tillage equipment was not at the staging area for observation.
- Seed tags from three lots were photographed
- Calculations that identify the amount of PLS application could not be provided.
- No wetland topsoil was removed; project creating a wetland/pond for storm water management.

Field Sampling

Four field samples were collected in the field using a push probe type sampler. The samples collected include:

- Uniform 0-6 inches (5 subsamples composited)

- NRCS/Field 0-5 inches (5 subsamples composited)
- No Salvage 0-12 inches (5 subsamples)
- Top Soil/wind rowed berm 0-6 inches (5 subsamples)

Samples submitted for analysis 5/28/2014

Summary

It should be noted that Western States Reclamation was not allowed to be part of this site visit due to contractor concerns about being assessed by their competition. As previously mentioned, no seeding was performed during the site visit.

It was unfortunate that a visual observation of the seeding operation did not occur at the project area. Although the ECS had limited time for this site visit and did not provide a tour of the revegetated area, I did not notice very many areas covered with mulch during my time on site.

Critical aspects of the CDOT revegetation process could not be verified during the visit. It is recommended that if there is enough project budget, another site visit be performed to watch the seeding and mulching operations and how amendments are added to the soil. Data gaps such as finding the percent vegetative cover should also be investigated.

New imported soil that will be used for temporary seeding

Wind rowed top soil area to the right; undisturbed reference site near fence line

Drill Seeder

Representative soil profile for all soil samples collected