

WRPI Watershed Management and Forest Water System Operations
San Bernardino National Forest Service

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WRPI Internship

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Table of Contents

Acknowledgements.....	2
Internship Summary.....	3
Project Objectives.....	3
Project Approach.....	4
Project Outcomes.....	4
Conclusion.....	5

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Internship Summary

Working under Cal State San Bernardino's Water Resources and Policy Initiatives (WRPI) program and for the San Bernardino Forest Service gave me the opportunity to develop and advance my skills as an undergraduate civil engineer. While interning there, I was able to assist the forest environmental engineer with current projects as well as accompany him on field work and activities pertaining to the water and environmental aspect of civil engineering. The duration of my time at the forest service included the creation of operation and maintenance plans for forest water systems and field work where I would gather data for those sites, such as locations of water system components through the use of GPS equipment and pictures to accurately describe and locate members of a water system. The operation and maintenance (O&M) plans were created to assist the environmental engineer, technicians or maintenance workers tending to the site, and on site personnel with operating water systems on their own, such as keeping the site up to date with inspections, troubleshooting, isolating portions of the system, and who to contact based on the problem. The sites of interest were City Creek Fire Station, Mormon Rocks Fire Station, Applewhite Picnic Area/Campground, Lytle Creek Fire Station, and Forest Falls Picnic Area.

Project Objectives

The environmental engineer is in charge of an assortment of projects and has a multitude of duties. They are also responsible for creating and updating Operation and Maintenance plans for forest water systems to ensure they are current and can best assist those working on the system when the environmental engineer is not present. Due to such a large influx of O&M plans that needed to be created, I was able to assist on creating the plans. Each of the O&M plans consisted of a water system background, responsibilities of the environmental engineer, other forest staff, and on site personnel, the facilities served, general maintenance, required reports, and instructions on how to

fill out a well production log. In addition, a system operations section needed to be included for assistance in troubleshooting the system, a CAD drawing was needed to show the layout of the system, photos needed to be taken to accurately depict components of the system, and manuals had to be included so that specific parts, such as the pump or motor, could be repaired.

Assisting the forest environmental engineer, creating O&M plans, and efficiently collecting field data has helped advance my skills and has begun to prepare me for my future goals as a civil engineer. It has also given me valuable experience which in turn has given me an advantage when looking to begin a full time job opportunity in the field.

Project Approach

To better understand each water system, at least one site visit needed to be conducted. I would perform minor research of the system and the location of all the components prior to the visit so that I could be as efficient as possible. Upon arriving, I would begin by taking pictures of the well enclosure and the control panel that operates the well pump and flow to the tank. Multiple pictures were needed in order to accurately show every component. I would work my way up through the system, capturing every valve, backflow device, and hydrant, up until I got to the tank. Each picture was geotagged for further use so that any future visitors could locate the desired component of the system. It was necessary that each part of the system had a picture so that an accurate O&M plan could be assembled and easily read by those unfamiliar with the system. With the new images and a better understanding of the water system, I was able to form an O&M plan for each site.

Project Outcome

To begin O&M plans for any site, a field visit was conducted. Assistance from the forest environmental engineer was given initially so that they could be conducted

properly. Collecting photos, data, and points from each site took two to three trips in order to gather all of the necessary information that needed to be inputted into the report. Once field data was collected and the initial background information was complete, the system operation and CAD drawing could be completed. The system operation gave a detailed description of how to turn on the system beginning with the well, how to isolate portions of the system, how to winterize the system, and how to start up the system after being shut down. The CAD drawing showed the layout of the system, including piping, well and tank location, locations of all valves and standpipes, and the facilities the water system served. Labeled pictures were then shown to better describe each component of the system, the location of components in reference to other components or landmarks on the site, and the flow of water throughout the well. Owners manuals for parts, such as the pump or motor, were included in the report to help those making repairs or troubleshooting the system. The final pages of each manual consisted of forms, such as multiple water system maintenance checklists.

In addition to creating operation and maintenance plans for forest water systems, I was able to accompany the forest environmental engineer during site visits for his own projects. I was able to collect water samples at various sites as well as help perform water system site assessments.

Conclusion

Having the opportunity to work with the San Bernardino Forest Service has been a wonderful experience. Not only are they all very welcoming and friendly, but they were very helpful and willing to assist me throughout the internship. Working closely with the forest environmental engineer has helped broaden my view about different opportunities there are for engineers following a water or environmental path. I was assigned meaningful tasks and have been able to perform real work that will be used by the agency. I am ever so grateful for my experience at the Forest Service and the opportunities they have given me.