Construction Completion Report

Groundwater Interim Action Phase 1

Former Frank Wear Dry Cleaner Site
Yakima, Washington

Prepared for

Washington Department of Ecology

March 2, 2015

Job No. 17800-23/Task 8

HARTCROWSER

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Prepared by

Hart Crowser, Inc.

Jill Kiernan, PE
Associate Engineer

Chris Martin, PE
Senior Project Engineer

8910 SW Gemini Drive
Beaverton, OR 97008-7123
Fax 503.620.6918
Tel 503.620.7284

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Construction Completion Report

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1.0 INTRODUCTION

This Construction Completion Report (CCR) summarizes and documents the Phase 1 environmental construction activities completed for the groundwater interim actions at the former Frank Wear Cleaners Site in Yakima, Washington. These interim actions are being completed by the Washington Department of Ecology (Ecology) to address tetrachloroethylene (PCE) and other volatile organic compounds in soil and groundwater at the Site and are described in the Draft Groundwater Remediation System Interim Action Plan (IAP) for the former Frank Wear Cleaners Site (Hart Crowser 2013). The interim actions selected for the Site as described in the IAP include enhanced *in situ* groundwater treatment through bioremediation, natural attenuation, institutional controls, and compliance monitoring.

The primary component of the groundwater interim action is *in situ* bioremediation using a groundwater recirculation system. The groundwater recirculation system is designed to continuously extract groundwater from downgradient extraction wells; convey the groundwater to a remediation building where the groundwater is amended with soluble substrate consisting of electron donors and nutrients to promote biological degradation of the contaminants; and inject the amended groundwater back into the subsurface to create a recirculation cell. Phase 1 of the groundwater recirculation system construction was substantially completed from September through November 2013 under the oversight of Hart Crowser and included the installation of 12 injection/extraction wells, installation of the remediation building and associated equipment, and trenching and pipe installation to connect eight of the 12 injection/extraction wells to the remediation building. Phase 2 of the groundwater remediation system is planned for the summer of 2015 and will include trenching and pipe installation to connect the remaining four extraction wells and re-piping at the remediation building to convert four extraction wells to injection wells.

This work was completed in accordance with the provisions of the Washington State Model Toxics Control Act (MTCA) and its implementing regulations of the Washington Administrative Code (WAC) Chapter 173-340, under the direction of Ecology's Toxics Cleanup Program (TCP).

1.1 Purpose of Report

The purpose of this CCR is to describe and document all of the major elements of the Phase 1 construction work completed for the groundwater interim action. Changes to the original design defined in the Contract Drawings and Specifications are also identified and described.

1.2 Report Organization

This CCR is organized into the following report sections as follows:

- **Section 2.0 – Site Background**; includes a description of the Site location, Site history, summary of the environmental conditions, and the selection of the groundwater interim action.
- **Section 3.0 – System Design and Pre-Construction Activities**; describes the system design, contractor procurement process, contractor selection, the pre-construction meeting, contractor submittals, permitting requirements, and the recirculation well installations.
- **Section 4.0 – Phase 1 Groundwater Interim Action Construction Activities**; provides a description of the major components of the construction activities including mobilization and Site preparation, installation of the groundwater recirculation and treatment system, trenching and pipe installation, vault and wellhead connections, utilities, surveys, soil disposal, Site restoration, and contractor demobilization.
- **Section 5.0 – Change Orders and Project Deviations**; describes the change orders issued and project deviations from the Contract Plans and Specifications.
- **Section 6.0 – Construction Oversight and Documentation**; describes the construction management tasks performed by Hart Crowser.
- **Section 7.0 – Construction Completion Schedule and Issues**; provides a summary of the overall adherence to the construction schedule and identification of any construction issues.
- **Section 8.0 – References**.

Appendix A contains the as-built drawings including pre-construction conditions. Sheet 1 in Appendix A provides a vicinity map showing the location of the Site. Sheet 2 in Appendix A provides a plan view of the Site layout and adjacent properties.

Approval of the contractor's, Engineering/Remediation Resource Group (ERRG), submittals are provided in Appendix B. Appendix C shows select photographs of the construction progress. Well construction logs are included in Appendix D. Change orders are provided in Appendix E. The Hart Crowser Daily Field Reports completed during construction activities are provided in Appendix F.

1.3 Limitations

Work for this project was performed, and this report prepared, in general accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of the Department of Ecology for specific application to the former Frank Wear Cleaners Site. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

2.0 SITE BACKGROUND

The following sections present the Site setting, surrounding area information, Site use history, and a description of previous environmental activities at the Site.

2.1 Site Location

The Site is located at 106 South 3rd Avenue, Yakima, Washington (Sheets 1 and 2 of Appendix A). The assigned Ecology Facility Site ID number for this Site is 444 and the Cleanup Site ID number is 4194. The former Frank Wear property is now a vacant gravel lot zoned within the Central Business District. The property is 0.16 acres in size and located within the northeast quarter of the southeast quarter of Section 24, Township 13 North, and Range 18 East of the Willamette Meridian, Yakima County, Washington. The property is bounded to the north by a privately owned asphalt parking lot, an alley and businesses to the west, a children's daycare facility (Buckle My Shoe Early Learning Center) to the south, and by South 3rd Avenue to the east (Sheet 2 of Appendix A). South of the daycare facility is a former boat dealership property, now occupied by the Central Washington Comprehensive Mental Health facility (CWCMH), which extends south to West Walnut Street. Sheet 2 of Appendix A provides a Site Plan showing the current Site layout and adjacent properties.

The Frank Wear Site is part of the larger Yakima Railroad Area (YRRA; Facility Site ID number 500 and Cleanup Site ID number 3632), a study area established by Ecology to investigate area-wide groundwater contamination. The YRRA consists of approximately 6 square miles of numerous contaminated small sites with commingled PCE plumes centered along the Burlington Northern-Santa Fe Railroad.

2.2 Site History and Environmental Conditions

Dry cleaning businesses operated at the Frank Wear Site from the early 1940s to 2000. The dry cleaning operations primarily used Stoddard solvent as the dry cleaning fluid, although sometime during the 1970s, the business began using PCE as the dry cleaning solvent. Spills, overflows, and leaks from equipment, and the on-site disposal of sludges from the spent solvent reclamation process have resulted in PCE contamination in soils and groundwater at the Site. Based on these releases, the Site has been identified as one source of chlorinated volatile organic compounds (cVOCs) within the broader YRRA plume.

Previous environmental investigations and interim cleanup actions have been conducted by various parties including Ecology since 1989 and are described in the IAP. Past groundwater monitoring has shown PCE concentrations up to 43,500 micrograms per liter (µg/L) in monitoring well MW-10 on the property within the footprint of the former dry cleaning building. The most recent investigation was the Data Gap Investigation completed in 2012 to delineate the extent of cVOC contamination in soil and groundwater (Hart Crowser 2012). Results of this investigation showed that PCE has migrated into the subsurface soils and groundwater to depths between 40 and 60 feet at and near the Frank Wear property. The horizontal extent of the PCE contamination in shallow groundwater extends from the Frank Wear property to downgradient wells MW-22 and MW-25 (Sheet 2 of Appendix A). Groundwater samples collected from most of the Site shallow monitoring wells (approximately 35 feet deep or less)

exceeded the MTCA Method B Cleanup Level for PCE of 5.0 µg/L. The Data Gap Investigation also showed detections of PCE in the on-property deep well, MW-18 (90 feet deep), suggesting vertical migration at depth, but off-site migration in the deeper zone did not appear to be occurring.

The Data Gap Investigation included an assessment of bioremediation data that indicated the subsurface conditions were favorable for an enhanced *in situ* bioremediation groundwater remedy. A bioremediation remedy utilizing a reductive dechlorination process was estimated to be the most effective remedy to reduce PCE concentrations to below the MTCA cleanup levels. The Data Gap Investigation concluded that the proposed groundwater remedy using enhanced *in situ* bioremediation with a recirculation system to deliver amendment as described in the 2007 Feasibility Study (FS) was still appropriate for the Frank Wear Site. Based on the Site conditions, the most effective operation of a recirculation system may be during periods of high water during the irrigation season to more effectively target the contaminants that are vertically distributed throughout the soil matrix and shallow aquifer.

2.3 Selection of the Groundwater Interim Action

Hart Crowser completed a draft FS comparing different remedial action approaches that will effectively meet the remedial action objectives and cleanup standards (Hart Crowser 2007).

Based on the evaluation of all of the alternatives identified in the IAP, a remedial action involving *in situ* bioremediation using a groundwater recirculation system with a soluble remediation substrate (amendment) and soil vapor extraction (SVE) provided the lowest cost alternative that was protective and satisfied the MTCA evaluation criteria described above. Other components of the selected alternative include natural attenuation, compliance monitoring, and institutional controls.

In this alternative, groundwater is continuously extracted from downgradient extraction wells, amended with substrate consisting of electron donors and nutrients to promote biological degradation of the contaminants, and re-injected into the subsurface at upgradient injection wells to create a recirculation cell. The *in situ* bioremediation alternative, using groundwater recirculation, directly reduces the quantity, toxicity, and volume of contaminants in soil and groundwater by either removing the contaminants from the subsurface or by destroying the contaminant mass in place. The *in situ* bioremediation alternative using groundwater recirculation was the least costly of all the alternatives.

The SVE system was installed by Ecology in April 2012 as an interim cleanup action designed to mitigate vapor intrusion and remove VOC mass from the subsurface. The implementation of the SVE system is consistent with the selected *in situ* bioremediation groundwater alternative and will augment the groundwater cleanup action and enhance the remediation timeframe through the removal of VOCs from the vadose zone.

3.0 SYSTEM DESIGN AND PRE-CONSTRUCTION ACTIVITIES

The following sections present a summary of the remedial design approach and elements and the major pre-construction activities completed in preparation for the on-site construction. The pre-construction activities included preparation of the design specifications and plans, contractor selection and submittals, permitting, and installation of extraction and injection wells. These activities are described in the following sections.

3.1 System Design

The key component for the *in situ* bioremediation approach is a groundwater recirculation and treatment system (GTS). For this approach, 10 new extraction/injection wells were installed for the recirculation system and two of the existing monitoring wells were over-drilled and converted to extraction wells.

The GTS will continually extract groundwater from downgradient extraction wells and convey it to a remediation building (GTS building) where it is amended with a substrate consisting of electron donors and nutrients that stimulate the reductive dechlorination process. Reductive dechlorination sequentially converts PCE to breakdown products, trichloroethene (TCE), *cis*-1,2-dichloroethene (*cis* -1,2-cDCE), and vinyl chloride (VC), and eventually to ethene and ethane gas, end products that are essentially harmless and easily broken down by other indigenous bacteria. The amended groundwater is injected into upgradient wells to create a recirculation cell. This approach results in the fastest and best contact between amendments and contaminants, captures re-injected amendments, provides downgradient hydraulic control, and accelerates Site cleanup. This approach also is an effective method for addressing contaminant sources under buildings, such as the adjacent daycare facility.

At the Frank Wear Site two recirculation treatment areas are designed. The first recirculation treatment area consists of four new extraction wells installed to the south of the daycare facility building, covered parking area, and garage. Groundwater is extracted from these four wells, pumped to the GTS building, amended, and injected into four new injection wells installed to the north (upgradient) of the Frank Wear property. To address the high levels of PCE at the north property boundary, such as the levels found in SPW-12 (2,300 µg/L, April 9, 2012), the injection wells were installed approximately 40 feet to the north of the property boundary to allow amendment to be recirculated through this contaminated area.

The new extraction/injection wells were installed between 35 and 40 feet below ground surface to address contamination found in the deeper portions of the shallow aquifer. The amendment initially consists of complex lactates that act as a surfactant to remove PCE sorbed to the soil matrix and at the same time provide a carbon source (electron donors) needed for the reductive dechlorination process. This step is followed by additional electron donor additions, nutrients, and surfactants until the PCE and degradation products have been treated to acceptable levels. It is estimated that the recirculation system in the first treatment area would operate for approximately 12 to 18 months based on the area

of contamination, estimated electron acceptor/contaminant mass, and existing oxidative state of the aquifer.

At the completion of operating the first recirculation treatment area, the second recirculation treatment area will become operational. The second recirculation treatment area consists of four extraction wells (two new and two existing wells (MW-3 and MW-4)) along the south side of the CWCMH building and West Walnut Street. Groundwater is extracted from these four wells, pumped to the GTS building, amended and injected into the four wells immediately south of the children's daycare center building (originally used for extraction wells in the first recirculation treatment area). This treatment area is estimated to operate approximately 12 to 18 months, assuming adequate groundwater volume are extracted and re-injected at the Site.

3.2 Contractor Procurement

Hart Crowser, under contract to Ecology, provided the environmental engineering services to design the groundwater interim action and provide construction oversight of the contractors during the construction phase. Hart Crowser was responsible for the preparation of design plans, specifications, and other contract documents to support Ecology's procurement of a construction contractor.

Detailed plans and specifications were prepared to implement all phases of the groundwater interim action and were based on the extent and magnitude of contaminated groundwater, known subsurface conditions, and physical obstructions on the ground surface (i.e., City of Yakima right of way). The installation of the extraction/injection wells was handled as a separate portion of the work with Hart Crowser subcontracting this work (See Section 3.7). The remaining portions of the interim action, including the installation of the remediation building and associated equipment, and trenching and pipe installation to connect all of the injection/extraction wells to the remediation building, were to be conducted by a construction contractor selected through the public bid solicitation process.

Hart Crowser prepared a bid package including the plans, specifications, and engineer's cost estimate, for Ecology to solicit bids from construction contractors through the public bid solicitation process. The scope of the work that went out to bid included the following:

- General conditions, including mobilization/ demobilization, bonds, insurance, project administration and submittals, surveying, environmental testing and controls, traffic controls, loading and hauling Ecology-furnished equipment, and project closeout;
- Construction of all twelve of the injection/extraction well head vaults, assemblies, and well piping;
- Construction of the remediation building slab;
- Remediation building installation;
- Electrical system; and
- Site improvements and Site restoration.

Ecology-furnished equipment included the remediation system building that was a prefabricated building previously assembled by Hart Crowser, a polyethylene mixing tank with a mixer motor and

tank heater, and the extraction pumps. The remediation building includes the control panel, flow meters, pressure transducers, transfer pump, and other components.

Ecology issued the request for bids on July 31, 2013. A voluntary pre-bid Site walk for potential bidders was held on August 15, 2013. Bids were due on August 27, 2013.

3.3 Contractor Selection

After an evaluation of the bids received, Engineering/Remediation Reconstruction Group, Inc. (ERRG), based in Martinez, California, was awarded the construction contract (Contract). The Notice to Proceed with the work was issued by Ecology on October 7, 2013. ERRG and their subcontractors were responsible for the implementation of the construction activities as specified in the Contract Drawings and Specifications. As the prime contractor, ERRG provided labor, equipment, and operations management for the project. ERRG also provided project management and field oversight of their subcontractors and vendors.

3.4 Pre-Construction Meeting

Prior to initiation of the on-site construction activities, a pre-construction conference call was held on October 16, 2013, with key personnel from Ecology, Hart Crowser, and ERRG. The topics discussed included staff introductions and roles, communications, project goals and expectations, contract requirements included conditions and terms of payment, construction schedule, contractor submittals, permitting requirements, change order process, health and safety requirements, and questions and clarifications on the Contract Drawings and Specifications.

3.5 Contractor Submittals

In accordance with the Contract Specifications, ERRG and their subcontractors and/or vendors were required to prepare and deliver submittals to Hart Crowser for review and approval, prior to implementing the work. These submittals included a construction schedule, health and safety plan, contractor quality control plan, shop drawings, and product data on materials.

Hart Crowser reviewed the submittals and either approved or requested revisions to the submittals. Each ERRG submittal was accompanied by a transmittal form that was used to identify the submittal, its corresponding specification reference, and the submittal date; and to track review comments and approval by Hart Crowser. Hart Crowser recorded review comments and approvals on the transmittal forms. The ERRG submittals were generally prepared within the time and scope requirements specified in the Contract Specifications, and were submitted to Hart Crowser for review prior to plan implementation and/or material purchase or delivery. Appendix B contains copies of the submittal transmittal forms maintained by Hart Crowser for reviewing and approving the ERRG submittals. A complete set of submittals is on file at the Ecology (Yakima) and Hart Crowser (Portland) offices.

In addition to Contract-specified submittals, the contractor's field staff were required to submit background check forms to the director of the CWCMH facility. Background checks are required for

any persons completing work on the CWCMH property (extraction wells EXT-2 and EXT-3 and associated trenches are on the CWCMH property). Prior to beginning work, field staff attended a meeting with the director of the CWCMH facility to discuss site-specific concerns associated with the property.

3.6 Permitting

ERRG was required to obtain three construction-related permits prior to initiating the on-site construction work. These included the Street Break permit and Temporary Right of Way permit from the City of Yakima (City); and an electrical permit from the Washington State Department of Labor and Industries. The Street Break permit was issued for pipe trenching and installation work in the public rights of way along West Walnut Street and South 3rd Avenue to ensure the street pavements and sidewalks impacted by the construction work would be restored to City requirements. The Temporary Right of Way permit was issued for the work in the rights of way to address lane closures and traffic control. The electrical permit was required for the electrical work including completing the service connection to the remediation building and installing electrical conduit and wire from the building to the extraction wells.

ERRG also obtained a permit from the City to use a nearby fire hydrant as a water source for various construction activities, such as concrete mixing and Site cleanup.

3.7 Recirculation System Well Installation

Prior to ERRG's mobilization to the Site, Hart Crowser subcontracted with Cascade Drilling of Portland, Oregon, to install wells for groundwater extraction and injection. Twelve extraction/injection wells were installed from September 3, through 14, 2013, using a Geoprobe® Model 8140LS compact roto-sonic drill rig.

All of the extraction and injection wells are constructed of 4-inch diameter polyvinyl chloride (PVC) casing. The extraction wells (EXT-1 through EXT-8) were installed to 40 feet below ground surface (bgs) and have a 20-foot well screen installed at a depth interval from 20 feet to 40 feet. Injection well, INJ-1, was installed to a depth of 40 feet bgs and has a 15-foot well screened installed at the depth interval from 20 to 35 feet bgs and a 5 foot section of solid PVC set from 35 to 40 feet bgs. The remaining injection wells, INJ-2, INJ-3, and INJ-4, were installed to 35 feet bgs and have a 20-foot well screen installed at a depth interval from 15 to 35 feet bgs. All of the wells were completed using traffic-rated monuments flush with the ground surface.

Existing groundwater monitoring wells, MW-3 and MW-4, were abandoned with extraction wells EXT-5 and EXT-8, respectively, reconstructed in their place. MW-3 and MW-4 were located within the City right of way on the north side of West Walnut Street. These wells were constructed of 2-inch diameter PVC wells to 35 feet bgs, with screens from 10 to 35 feet bgs. The locations of MW-3 and MW-4 were ideal for use as extraction wells, but their 2-inch diameters would not provide sufficient extraction rates or allow installation of the extraction pumps, so they were re-installed as extraction wells with a larger diameter.

The location of these wells (INJ-1 through INJ-4 and EXT-1 through EXT-8) and the well construction details are shown on the As-Built Drawings in Appendix A. Photographs of the well installation work are included in the photograph log of Appendix C. Well construction logs are included in Appendix D.

3.8 De-scoping of the Construction Work

The original design requirements specified the connection of extraction wells EXT-5 through EXT-8 to a piping alignment in West Walnut Street. A water service line, located to the east of EXT-5, connects the CWCMH facility to an 8-inch water main on the north side of West Walnut Street. Connecting EXT-5 to the piping alignment in West Walnut Street would have required crossing this water service line. The Contract Specifications required the contractor to meet the City requirements for water line separations and crossings in the public rights of way.

During the process of ERRG obtaining work approvals from the City, ERRG determined that meeting the City's requirements for the water line separation (5 feet horizontally and 12 inches vertically) of the piping alignments would require excessive trench excavations involving deep excavations with sloping and large trench boxes that were not anticipated during the bidding process. ERRG also had additional concerns that the City placed a moratorium on street work in South 3rd Avenue which would require repaving the entire lane width instead of just the trench width, adding additional requirements to the project. These additional requirements would have extended the schedule of construction work an additional week, beyond the window when hot mix asphalt for repairing the street would have been available.

Because of these additional project requirements and scheduling concerns, Ecology de-scoped the work for ERRG, eliminating the portions of work involving trenching and pipe installation work in West Walnut Street, including the connections at EXT-5 through EXT-8, and South 3rd Avenue. The work approved for ERRG to proceed, referred to as the Phase 1 work, included all of the remaining work previously scoped in the bid documents. In summary, the Phase 1 work included installation of well vaults at 8 of the 12 injection/extraction wells, assembling equipment at the well heads at extraction wells EXT-1 through EXT-4 and injection wells INJ-1 through INJ-4, trenching and installing pipe from extraction wells EXT-1 through EXT-4 and injection wells INJ-1 through INJ-4 to the remediation building, installing the remediation building and associated equipment, establishing electrical connections to the extraction well pumps and at the remediation building, and testing and startup of the groundwater remediation system. This Phase 1 work allowed for the operation of the first recirculation treatment area between injection wells INJ-1 through INJ-4 and extraction wells EXT-1 through EXT-4.

Phase 2 of the groundwater remediation system is planned for the summer of 2015 and will include trenching and pipe installation to connect the remaining four extraction wells EXT-5 through EXT-8 and re-piping at the remediation building to convert four extraction wells EXT-1 through EXT-4 into injection wells for operation of the second recirculation treatment area.

4.0 PHASE 1 GROUNDWATER INTERIM ACTION CONSTRUCTION ACTIVITIES

This section provides a description of the major components of the Phase 1 groundwater interim action construction activities. The construction work was completed by ERRG and their subcontractors. Hart Crowser provided construction oversight as Ecology's representative during the construction.

4.1 Mobilization and Site Preparation

ERRG and Hart Crowser mobilized staff and equipment to the Site and began Site preparations on October 28, 2013. As part of the mobilization ERRG established work limits and equipment and material staging areas, set up temporary barriers to control Site access, set up erosion and sediment control measures, and set up a portable lavatory for field staff.

The remediation building for the groundwater recirculation system was to be located on-site west of the SVE building. ERRG cleared miscellaneous debris and relocated investigation-derived (IDW) drums of soil and water remaining from the data gap investigation and well installations from the on-site area within the footprint of the remediation building. The 35 drums of IDW were moved to the northeast portion of the property near South 3rd Avenue pending waste determination and off-site removal. The existing fence on the western side of the SVE treatment system was removed to allow construction of the foundation pad for the remediation building. Temporary fencing was brought to the Site to restrict access to the Frank Wear property during construction.

4.2 Groundwater Recirculation and Treatment System

The GTS includes a prefabricated remediation building that houses the programmable logic control (PLC) panel, flow meters, pressure transducers, transfer pump, and other components; a 1,200-gallon polyethylene mixing tank with a mixer motor and tank heater; and the extraction pumps installed in the extraction wells. The building dimensions are 8 feet wide by 12 feet long by approximately 6 feet high, with the sides and roof covered with galvanized sheeting. The building sits on an I-beam skid. The building was designed to accept water from eight extraction points and inject into six points at one time. The building is also equipped with a sediment filter and an ozone treatment unit, neither of these units are currently in use. The polyethylene mixing tank installed next to the building is used to add and mix amendments into the collect extracted groundwater prior to re-injection.

4.2.1 GTS Building Foundation

On October 28, 2013, after removing portions of the treatment compound fence, ERRG excavated the ground surface under the proposed GTS building footprint to 6 inches below grade and compacted the subsurface. Compaction was tested by PLSA Engineering and Surveying (PLSA) of Yakima, Washington, under subcontract to ERRG. Six inches of structural backfill was imported, compacted, and tested to provide a base for the concrete foundation. The base material passed the compaction testing requirements. Density tests were completed using a nuclear densometer and proctor samples were collected previously for reference.

The form for the concrete pad was constructed of 2 by 4 lumber placed onto the compacted structural backfill. The form was raised approximately half an inch using excess base rock to get a full 4 inch thickness required by the Contract Specifications (Note, 2 by 4 lumber actually measures 1.75 inch by 3.5 inches). The concrete pad was reinforced using #4 rebar placed in a grid pattern spaced 12 inches apart with the ends terminated approximately 4 inches from the edge of the pad. The rebar grid was tied together using wire.

The concrete foundation was poured on October 29, 2014. While the concrete truck was pouring concrete, ERRG staff manually lifted the reinforcing rebar grid approximately 2 inches off the ground to the center of the slab. The concrete pad was smoothed and leveled while it cured using the top of the form for reference. Once almost dry, the pad was textured using a broom to prevent the GTS building from slipping once installed.

4.2.2 GTS Building Installation

The GTS building was picked up by ERRG staff from a storage yard in Sherwood, Oregon, and transported to the Site on the weekend of November 2 and 3, 2013. The GTS building was removed from the travel trailer and stored within the fenced private parking lot north of the Frank Wear property on November 4, 2013, using a large forklift. The GTS building was placed on the concrete pad using the large forklift on November 8, 2013.

To anchor the building to the slab, ERRG bolted 4-inch segments of angle iron on each of the four sides of the concrete pad. The angle iron wraps over the I-beam footing of the GTS building, holding it in place. One angle iron bracket is used for each side of the building. One bolt is used to anchor the bracket to the pad.

4.2.3 GTS Building Connections and Equipment

Electrical. Available electrical power for the GTS was 480 volt power supplied from the circuit breaker on the SVE system. However, to run the required groundwater treatment equipment, electrical power to the GTS building was supplemented by a 240 volt step-down transformer mounted on a separate concrete pad on the western side of the GTS building. Underground electrical conduit was run from the SVE circuit breaker to the transformer. Electrical power out of the transformer was then connected to the GTS building via underground conduit.

Power supply wires for the four extraction well pumps are directed to the north side of the GTS through underground conduits. Electrical conduit for batch tank equipment (i.e., tank mixer and heating element), originates from the north side of the GTS building, runs beneath the GTS building, then wraps around the east side of the building and connects above ground on the south side of the GTS building. Manual on/off power switches are installed on the south side of the GTS building for the mixing tank equipment. Conduit is installed above ground to the top side center of the batch tank where the mixing and heating equipment is located.

Phone. The GTS is equipped with an auto-dialer to call Ecology and Hart Crowser personnel when a system alarm is triggered. The auto-dialer uses a phone line connection supplied from a utility pole

located at the northwest corner of the Frank Wear property. The phone line connects to the SVE system building then to the GTS building. An underground conduit was previously installed to carry the phone line from the utility pole to the SVE system. This conduit passes along the northern boundary of the GTS building and was never used. Instead, the phone line was connected overhead from the utility pole to the SVE building.

The previously unused telephone conduit was retrofitted to carry the phone line from the SVE system building to the GTS building. The conduit was exposed and cut as it passed the GTS. The two segments of the conduit (one from the pole to the GTS and one from the SVE to the GTS) were directed to the edge of the GTS building where an electrical junction box was installed to facilitate the phone connection into the building. The conduit from the pole to the GTS building is still unused, while the conduit from the SVE to the GTS carries the phone line connection.

System Testing. Electrical connections to the GTS building were completed on November 20, 2013. Once power was connected, testing of the GTS features could begin. The internal lights to the GTS building, internal building heater, and PLC panel display were switched on and worked properly without adjustments or repairs. The electrical and telephone connections into and out of the GTS building were also tested and worked without issue. The extraction pumps were tested by manually activating each pump using the PLC panel. The pumps were activated for at least 60 seconds until flow registered on the respective flow meter, then they were shut off. The batch tank mixer was activated at the PLC panel and could be manually observed to be working. The batch tank heater was activated using the switch installed on the exterior of the building, voltage readings were taken at the switch to determine that the heater was working.

4.3 Trenching and Piping

Trenching was necessary to install underground conveyance pipe from the extraction and injection wells to the GTS building and electrical conduit from the extraction wells to the GTS building. Soil consisted of silty cobbles, which made trenching difficult due to potential and actual cave-ins of the excavation side walls. Trench and piping details are provided in the construction as-built drawings in Appendix A.

4.3.1 Trenching and Backfilling

Trenches were generally wider than the minimum width provided on the plan drawings to provide stable working conditions against cave-ins. Trenches were completed up to 5 feet deep, as necessary. No groundwater was encountered in any of the trenches.

A minimum of 6 inches of 3/4-inch minus base rock was placed in the bottom of each trench. The pipe bedding was compacted to 90 percent maximum dry density or greater and the compaction tested by PLSA approximately every 200 linear feet of trench. Groundwater conveyance pipe was placed on the compacted bedding material and spaced at least 6 inches apart from other pipes. Electrical conduit was place without separation from other electrical conduit as allowed by state code, but were placed 6 inches from groundwater pipe. Pipe bedding material was placed to 6-inches above each conveyance pipe and compacted. If a second row of pipes were required, they were placed on top of

this bedding material with an additional 6-inch lift of pipe bedding material placed on top of them. The trenches were brought to grade by placing trench backfill material in 12-inch lifts and compacted to project specifications.

Trenching began on October 29, 2013, in the private parking lot north of the Frank Wear property where injection wells INJ-1 through INJ-4 are located. ERRG contracted a concrete cutting firm to cut the asphalt within the trench alignment for the injection wells. While the concrete cutting firm was on the Site, they also cut the concrete on the South 3rd Avenue sidewalk where extraction well trenches were to be located. The injection wells and trenches are oriented in a line in the east-west direction upgradient of the Frank Wear property bringing the conveyance pipe toward the north end of the GTS building. The trench passed under the parking lot fence onto the Frank Wear property where it wrapped around and connected to the south side of the GTS building.

Trenching from extraction well EXT-1 to the GTS began on November 4, 2013. EXT-1 is located in the northwest corner of the daycare center property. The trench was completed in the north and northeast direction to connect this well to the GTS.

ERRG staff began trenching for extraction wells EXT-2 and EXT-3 within the landscaped area on the north end of the CWCMH property on November 6, 2013. Shrubs and landscape fabric were removed to complete the trenching from EXT-2 and EXT-3 towards South 3rd Avenue. Trees adjacent to the trench were trimmed back a minimal amount to allow room for excavation equipment. Roots encountered were not cut but were left undisturbed as much as feasible during trenching. This extraction well trench is directed in the eastern direction through the landscaping towards EXT-4 in the right of way. Once the extraction well trench reaches EXT-4, the trench is oriented north through the South 3rd Avenue sidewalk to the Frank Wear property. The trench was completed in the western direction across the Frank Wear property to where the extraction wells connect to the southwest corner of the GTS building.

4.3.2 Piping and Electrical Conduit

The pipe layout plan was designed to minimize pipe bends and trenching volume while navigating underground and above ground obstructions. Bends in the groundwater conveyance pipe runs consist of 45-degree elbows. Where 90-degree bends were required, two 45-degree elbows were installed in short sequence. For detailed pipe layout refer to the As-Built Drawings included in Appendix A.

Groundwater conveyance pipe consists of single-walled 2-inch diameter Schedule 80 PVC. Piping extends underground continuously from each wellhead of the extraction/injection wells to the GTS. Each extraction/injection well has an individual conveyance pipe (i.e., flow is not combined in underground piping). The pipe is installed a minimum of 24 inches bgs with the exception of within each well vault and where conveyance pipe enters the GTS. At the GTS, pipe is fitted with insulation and external heat tape that is temperature activated by a thermometer located on the outside of the GTS building. Exposed pipe in each vault is not temperature protected because the temperatures inside the vaults typically do not drop below freezing. Heat emanating from groundwater in the well

tend to keep the interior of the vaults above freezing and additional heat is provided while pumps are active.

Each conveyance pipe was placed on 6 inches of compacted bedding material within the trench. Six inches of vertical and horizontal space was given to each groundwater conveyance pipe when more than one pipe occupied the trench. A solid 12-gauge tracer wire was attached to each individual conveyance pipe prior to burying the pipe. Underground tracer wire connections have the tendency to break or become unconnected following construction making them inoperable. Underground connections were minimized by using a single continuous tracer wire for conveyance pipe where possible. When necessary, tracer wire segments were connected using a 3M Direct Bury Splice Kit designed for this purpose. The connector is moisture-proof and gel-filled to prevent corrosion. Additionally, for utility locating purposes, conveyance pipes were marked with detection tape labeled with "CAUTION: RECYCLED/RECLAIMED WATER LINE BURIED BELOW" approximately 6 inches above each pipe.

Modifications to the conveyance pipe included adding two 45-degree elbows to adjust the location of the pipe trench as it crosses the Frank Wear property (shown in Appendix A). The trench was diverted approximately 5 feet south (towards the daycare) to avoid trenching under an abandoned gas line.

Electrical conduit that accompanied the conveyance pipe was installed and inspected per State of Washington code. State code allows for multiple electrical conduits to be placed together without separation when multiple conduits occupy the same trench. Electrical conduits were installed without spacing, instead of the 6-inch spacing as shown on the Contract Drawings. Six inches of space were still provided between groundwater conveyance pipe and electrical conduit. Electrical conduit enters the step-down transformer before continuing to the GTS building.

4.3.3 GTS Pipe Pressure Testing

Specifications. Complete runs of underground conveyance pipe and fittings were tested for leaks using a hydrostatic pressure test. Pipes were filled with water and the pressure brought up to 150 pounds per square inch (psi). The Contract Specifications required that the pipe be able to hold pressure for 30 minutes with a pressure loss of 5 psi or less to be considered passing. Hart Crowser was present for all pressure tests. Hart Crowser recorded the testing procedure and test results as discussed below.

Procedure. ERRG rented a hydrostatic test pump designed for this purpose (manufactured by Rice Hydro Inc.). The hydrostatic pump was set up at the GTS building near the conveyance pipes. The pump reservoir was filled using potable water from the fire hydrant along South 4th Avenue. The entire length of underground conveyance pipes were tested from the GTS building to the wellheads. The exposed end the conveyance pipes at the GTS was fitted with a glued PVC slip coupling, then reduced to hold a 3/4-inch galvanized tee fitting with a pressure gauge. A ball valve was fitted to the opposite end of the tee where the hydrostatic pump hose was secured. At each wellhead, the conveyance pipe was fitted with a glued PVC slip coupling and reduced to hold a 1-inch ball valve. The ball valve was open to the atmosphere.

The testing procedure was as follows:

- The conveyance pipe was slowly filled with water from the hydrostatic test pump with the ball valve at the wellhead open to purge air from the lines.
- Once water was flowing steadily, the ball valve at the wellhead was shut and the pressure allowed to build within the pipe as recorded on the gauge at the GTS building.
- When pressure built up to 150 psi, the ball valve at the GTS was closed.
- The gauge installed in the tee fitting was monitored for pressure loss.
- If no immediate pressure was lost (e.g., leaking valve), the hydrostatic pump hose was removed from the top of the tee (not disturbing the test in progress) and fitted onto the next conveyance pipe.
- The conveyance pipe remained undisturbed for 30 minutes and the pressure was recorded.

Results. Test failures were typically encountered during the initial pressure tests and were due to leaking valves and fittings. Once an adequate valve setup was determined, the results generally met the specified requirements and were repeatable.

In one case, a failed pressure test was due to a broken pipe. The conveyance pipe for EXT-3 had a hairline fracture in the pipe at the wellhead where the pipe passes under the vault wall. The fracture was not visible until internal pressure was applied to the pipe. During testing, the hydrostatic pump could not reach 150 psi, and pressure would quickly drop after the pump was shut off. This was a different observation from when there was a leaking valve and pressure would very slowly drop in the pipe. The broken pipe section was replaced and the new pipe retested. The new pipe passed the pressure test.

4.4 Vaults and Wellhead Connections

4.4.1 Vaults

Groundwater Treatment Vaults. Vaults were purchased by ERRG based on requirements provided in the Contract Specifications. Vaults are manufactured by Emco® Wheaton and meet AASHTO H20 wheel loading requirements. The eight extraction well vaults measure 24” by 24” by 24” deep. The four injection well vaults measure 18” by 18” by 18” deep. To reduce the footprint of the vaults on the private parking lot, smaller vaults were used since injection well vaults do not house electrical components. The vaults have an open bottom and are equipped with double-hinged, lockable lids, with water tight lid seals, and lift assisted hydraulics.

The vaults were installed over the existing extraction/injection wellheads and the end of the groundwater conveyance pipe associated with the well. For the Phase 1 work, vaults were installed at extractions wells EXT-1, EXT-2, EXT-3, and EXT-4, and injection wells INJ-1, INJ-2, INJ-3, and INJ-4. The vaults provide access to the wellhead and house the wellhead connection hardware (described below).

To install the vaults, ERRG excavated the soil around each wellhead to a depth of at least 6 inches below the total depth of the vault. This additional depth was refilled with gravel and compacted so that the vaults rest just above the surrounding grade. An additional 6 inches was excavated from all sides of the vault. This space was subsequently filled with gravel and compacted to 6 inches below grade. The remaining 6 inches was filled with concrete, and the concrete was smoothed and tapered to shed surface water and prevent ponding on the lid. EXT-2 and EXT-3 are located within landscaping south of the daycare center building. These wells did not receive the concrete skirt, instead excavated topsoil was used to fill to grade.

Electrical Pull Boxes. Electrical pull boxes are required to run wire through the electrical conduit from the extraction wells to the GTS building. The Contract Specifications specified that wire could not be pulled through conduit in excess of 360 degrees in total bends including 90-degree vertical bends. Three pull boxes were installed to facilitate this requirement. One at the 90-degree bend within the South 3rd Avenue sidewalk where conduit turns from east to north. A second pull box was installed on the eastern boundary of the Frank Wear property where conduit turns from north to west. A third pull box was located at the south end of the GTS building before wires are connected to the GTS building.

Pull boxes are galvanized utility vaults that are installed flush with the ground surface. They measure approximately 12” by 18” by 12” deep. These vaults are not traffic rated.

4.4.2 Wellhead Connections

Extraction Wellheads. Extraction wellheads are contained within 24” by 24” by 24” deep vaults described above. Each vault was installed with the top of well casing offset to one side to provide room for wellhead connections and electrical components. The extraction wells are capped with a cast-iron well seal with 1.25-inch diameter opening for the pump riser. The pump risers were connected to the 2-inch diameter conveyance pipe using 1.25-inch diameter fittings. To make the connection the following fittings were used, starting at the well seal:

- Galvanized tee fitting with pressure gauge,
- Aluminum cam-lock fitting,
- Gate valve,
- Check valve,
- Galvanized union,
- Schedule 80 tee fitting with sampling port, and
- Ball valve.

A variety of elbows and thick rubber hose were used to make the sequence of valves fit within each vault.

Electrical components within the extraction vaults were installed by ERRG’s subcontracted electrician, MBI Construction Services, and were inspected by a Washington State Department of Labor and Industries inspector. Components are mounted to the vault wall and consist of a junction box and manual on/off switch for the extraction pump. All components are waterproof construction.

The 4-inch diameter well casings were cut to fit all the required components into each vault.

- EXT-1 was cut a total of 15" from the original elevation,
- EXT-2 was cut a total of 6" from the original elevation,
- EXT-3 was cut a total of 16" from the original elevation, and
- EXT-4 was cut a total of 14" from the original elevation.

ERRG's on-site Project Manager, Tim Solotta, was licensed in the State of Washington to modify the monitoring wells and provided the well modification forms to Ecology for these modifications.

Injection Wellheads. Injection wellheads are contained within 18" by 18" by 18" deep vaults described above. Each vault was installed with the top of well casing offset to one side to provide room for wellhead connections. Conveyance pipe was connected to the wellhead using 1.25-inch diameter fittings. To make the connection the following fittings were used, starting at the conveyance pipe:

- Ball valve,
- Check valve,
- Gate valve,
- Aluminum cam-lock fitting, and
- Galvanized tee fitting with pressure gauge.

At the time of installation, a rubber flexible coupling and reducer bushing was used to connect the 4-inch diameter well casings to the conveyance pipe as specified in the Contract Specifications.

When the system became operational, the rubber flexible coupling would dislodge from the well casing when just a little pressure was applied. The rubber couplings were replaced with 4-inch diameter cam-lock fittings in the summer of 2014. The original pressure gauges were rated for up to 150 psi, so with the small amount of pressure buildup in the injection wells, reading the pressure gauges was difficult for field technicians. The original gauges were replaced with 30 psi gauges in the summer of 2014.

4.4.3 Pumps and Pump Risers

Stainless steel submersible 3-inch diameter Grundfos pumps were installed in each of the four extraction wells, EXT-1 through EXT-4. The pumps installed in EXT-1, EXT-2, and EXT-4 are model 10 SQE05-160, rated at 10 gallons per minute (gpm) at 160 feet of head. The EXT-3 pump is a model 15 SQE07-150, rated at 15 gpm at 160 feet of head.

The riser pipe installed was 1.25-inch diameter Schedule 40 PVC with threaded ends for connection to the pump. A stainless steel safety cable was also installed for lowering and lifting the pump, with the end fastened to the eyelet at the discharge location of the pumps.

All of the pumps were installed such that the top of the pump was at a depth of 35 feet below the top of the well casing. This places the pump intake at approximately 35.5 to 36 feet below the top of the well casing.

4.5 Utilities

A variety of utilities were encountered or used during the Phase 1 construction of the interim action. Generally, most of the utilities are installed within the alleyway to the west of the property. These include water, communication, sewer, irrigation, and gas lines.

Water. Municipal water is supplied to the area from an underground water main running east-west along the north side of West Walnut Street and north-south along the east side of South 3rd Avenue. A service line travels under South 3rd Avenue providing the daycare center with water. The service meter and service line for the daycare center were marked by utility locators and are visible within the service vault installed along the sidewalk in front of the daycare center.

For construction purposes, City code requires non-potable water lines be installed below the City's water lines where possible, but there are no requirements for non-potable water lines to pass under private service lines. Groundwater conveyance lines were installed over the daycare center service line with greater than 6 inches of separation between groundwater lines and the service line. Water service for the daycare was not disturbed during construction activities.

With a City permit, ERRG accessed water for backfill compaction, dust control, and other work by tapping into the City's fire hydrant on South 4th Avenue.

Electrical. Electrical power is supplied to the Site and neighboring properties from overhead lines. The electrical lines are carried through the alleyway on a series of utility poles. Electrical power for construction was supplied by the SVE system building or by generators. No contact between construction equipment and overhead utility lines was observed during construction. Electrical connection to the GTS building was described in Section 4.2.3 - GTS Building Connections and Equipment. A buried electrical line was identified by utility locators in the landscaped area on the CWCMH facility. The location of the buried utility suggests that it was a power line for parking lot/street lights located along the east side of the CWCMH property. The utility was identified near the EXT-2 and EXT-3 trench, but was not exposed during construction.

Telephone. Telephone service is provided by an above-ground service line located within the alleyway. Telephone line connection is described in Section 4.2.3 - GTS Building Connections and Equipment.

Natural Gas. Natural gas is supplied to area businesses via an underground gas main running through the alleyway. The former Frank Wear Dry Cleaner building that was demolished in 2000, was supplied with natural gas from the alleyway. The gas meter remains in-place, above ground on the west side of the alley.

While trenching across the Frank Wear property an approximately 3/4-inch diameter steel line cased in yellow plastic was exposed. ERRG called Cascade Natural Gas who determined that the gas line was capped and had been decommissioned. At the time, it was not clear whether the gas line still contained residual natural gas. To avoid further disturbing the gas line, the groundwater conveyance

trench was moved to the south approximately 5 feet. Cascade Natural Gas later reassessed the gas line and determined it was capped at the connection in the alley and did not contain residual gas.

Soil Vapor Extraction Lines. Soil vapor extraction lines were installed on the Site in 2012 during construction of the SVE system. These conveyance lines are constructed of 2-inch diameter Schedule 80 PVC and are typically installed approximately 2 feet bgs. Groundwater conveyance lines were installed below the SVE lines with a minimum of 6 inches of separation. SVE lines were not damaged during installation of groundwater conveyance lines.

Stormwater Dry Well. A stormwater dry well was present on the Frank Wear property. The drywell consisted of a 48-inch diameter concrete sump approximately 8-feet deep which tapered to a 24-inch diameter metal grate at the ground surface. The drywell was abandoned in-place during construction activities. ERRG removed the metal grate and collar and filled the sump with concrete to approximately 3 feet bgs. During trenching activities, the walls of the sump from 0 to 3 feet bgs were broken apart and added to the concrete/asphalt pile for off-site disposal. The GTS batch tank currently sits on top of the abandoned sump.

4.6 Surveys

An initial Site survey was performed by PLSA to establish control points, key Site features, and work limits. Intermediate surveys were performed during trenching before the trenches were backfilled to survey locations of the groundwater piping and pipe elevations every 100 feet of length. A final survey was also completed to document the location and elevation of the GTS building concrete pad, and locations of the injection/extraction wells and the new fencing that was installed. Survey results were forwarded to Hart Crowser and incorporated into the As-Built Drawings in Appendix A.

4.7 Soil Disposal

Soils excavated for the trenching work were stockpiled and tested to determine their management and disposal requirements. These soils were found to be unsuitable for backfilling the trenches because they did not meet material requirements in the Contract Specifications. Some of the soil stockpiles were found to contain low concentrations of petroleum contaminants and one stockpile had a low detection of PCE. These soils were determined by Ecology to be contained-in soils, not requiring disposal as dangerous or hazardous waste. There were 429.12 tons of petroleum-contaminated and PCE contained-in soil disposed as nonhazardous soil at the Terrace Heights Municipal Landfill in Yakima, Washington, on November 13 and 14, 2013.

4.8 Site Restoration and Contractor Demobilization

Site restoration included extending and rebuilding the GTS/SVE system compound fence, sweeping the private parking lot and CWCMH facility parking lot, final grading of Site gravel surfaces, restoration of the asphalt and concrete surfaces in the rights of way, and replanting removed landscaping on the CWCMH facility property. Contractor demobilization included the removal of all of ERRG's equipment, temporary facilities, trailer, portable sanitation station, temporary fencing, and all construction wastes from the Site.

5.0 CHANGE ORDERS AND PROJECT DEVIATIONS

Construction activities were modified in response to unexpected field conditions, opportunities to increase efficiency or improve construction methodology, requests for additional work, and adjustments to the Site work directed by Ecology and Hart Crowser. A total of three change orders were issued during the project. The following sections provide a brief description of each of these change orders and project deviations. Copies of each change order are included in Appendix E.

5.1 Summary of Change Orders

The following change orders were issued for the project work.

Change Order No. 1 requested on October 25, 2013:

- Replace Fernco© fittings at the four extraction wellheads with threaded couplings;
- Increase extraction well riser pipe and fittings to 1.25-inch diameter from 1-inch diameter; and
- Add stainless steel lifting cable between the well seals and the extraction pumps for all of the extraction wells.

The Contract Specifications specified flexible coupling at the wellheads but it was determined that rigid mechanical or glue-on type fittings were more appropriate to reduce the potential for leakage. Upon review of the extraction pump requirements, a change in riser pipe diameter and the need for lifting cable were deemed appropriate for the extraction wells. Ecology approved Change Order No. 1 on November 1, 2013.

Change Order No. 2 requested on November 8, 2013:

- Install new 2-inch Schedule 80 electrical conduit;
- Purchase and installation of a step-down transformer converting the 480 volts supplied by the SVE system to 240 volts as required by the GTS;
- Install concrete pad for the transformer; and
- Install additional fence to extend around the new transformer and concrete pad.

There was a spare 4-inch Schedule 40 PVC pipe on the north side of the SVE system that was available for use for the groundwater interim action work. The electrical inspector did not allow the use of this pipe as electrical conduit, so new 2-inch Schedule 80 conduit had to be installed.

The Contract documents were prepared with the assumption that 240 volt power was available at the SVE system for connection to the GTS. Upon review of the available power, it was determined that only 480 volt power was available and that a step-down transformer would be required to convert power from 480 to 240 volts. The transformer required a concrete pad for it to be mounted. Additional fence was also necessary to encompass the new transformer and pad. Ecology approved the Change Order No. 2 on November 27, 2013.

Change Order No. 3 – Contract Work De-Scoping:

- De-scoping of the work as described in Section 3.8 resulted in a reduced sum of the total base bid amount for general conditions, well head assemblies and well piping, electrical system, and Site improvement and restoration. Ecology authorized the Change Order No. 3 on April 22, 2014.

5.2 Project Deviations

The project deviations from the Contract Plans and Specifications were discussed in detail in the respective construction element sections above and are summarized as follows:

- **Trench backfilled prior to pressure testing.** Contract Specifications requested that the entire length of conveyance pipe remain exposed during pressure testing. This was not feasible during construction due to pedestrian safety concerns regarding an open trench and due to the added time this would require. Instead, trenches were backfilled as described in Section 4.3.1. If any failure was observed in a pipe run, that trench section was excavated until the problem pipe area was identified. Only the EXT-3 pipe produced a failure during testing. This was due to a hairline fracture in the pipe near the well vault. As previously described, this pipe section was replaced and retested.
- **Electrical conduit spacing in trenches.** The Contract Specifications required that electrical conduit be spaced 6 inches apart from each other as with groundwater conveyance pipe. A state-approved electrician was required to install all buried electrical conduit. Upon consultation with the electrician, it was decided that the conduits could be placed together within the trench without spacing which is allowed by State Code. This change resulted in a decrease in trench width and reduction in excavation effort.
- **45 Degree bends in conveyance pipe on the Frank Wear property.** The trench on the Frank Wear property was diverted approximately 5 feet to the south of the Contract Drawing alignment to avoid trenching under an abandoned gas line. This modification required the installation of two 45-degree elbows to adjust the location of the pipe trench.
- **Dry well decommissioning.** The drywell located on the Frank Wear property was not addressed in the Contract Specifications. The drywell was abandoned in-place as described in Section 4.5.

6.0 CONSTRUCTION OVERSIGHT AND DOCUMENTATION

Ecology retained Hart Crowser to serve as construction manager during implementation of Phase 1 to ensure execution of the project in accordance with the contract documents and the plans and specifications, and to document and verify the construction work. Construction management involved both on-site and off-site duties, consisting of daily construction observation and off-site engineering and managerial support. Specific construction management tasks included:

- Monitoring construction performance and documenting field observations, which included keeping a daily log of field activities, taking photographs, and completing daily field reports. Hart

Crowser daily field reports are provided in Appendix F and selected representative photographs are shown in Appendix C.

- Tracking contractor construction quality assurance and quality control (QA/QC) to ensure compliance with the plans and specifications.
- Attending project progress meetings and Site inspections.
- Communicating and coordinating with Ecology and the contractor, serving as Ecology's representative in the field. This included communication of all deviations from the contract documents, change requests, field directives, and information requests from the contractor to Ecology.
- Reviewing and providing recommendations to Ecology on contractor submittals, contractor pay applications, requests for information, and change requests.

6.1 Communication

Hart Crowser field engineer maintained regular communications with the Hart Crowser Project Engineer, the ERRG field engineer, and the Ecology Project Manager regarding work activities, work progress, and issues. The Hart Crowser Project Manager communicated regularly with Ecology and the ERRG Project Manager regarding work progress, schedules, issues, and resolutions.

6.2 Field Oversight and Documentation

Hart Crowser maintained a field engineer at the Site during all of the construction activities to provide oversight of the work. Oversight included tracking work progress, inspecting the work to ensure conformance with the Contract Drawings and Specifications, ensuring compliance with the Site safety requirements, and monitoring and tracking all material deliveries to the Site.

Hart Crowser field engineers completed construction reports on a daily basis. Copies of these reports are included as Appendix F. Items recorded on each report included weather conditions, on-site personnel, Site visitors, major equipment used, types and amounts of materials delivered to the Site, non-conformance noted, summary of work completed, safety concerns, and miscellaneous notes and issues. A digital camera was used for photo-documentation. Select photos of the various stages of construction are included in Appendix C.

6.3 Inspections

Inspections were performed by Hart Crowser and ERRG at intermediate stages of the work completion, including at the completion of trenching, pipe installation, backfilling, compaction testing, and pipe pressure testing. The inspections were performed to provide acceptance of the work prior to initiation of the next stage of the work.

At the completion of the all on-site construction activities, a Pre-Final Inspection was of the Site was performed by Ecology and Hart Crowser on February 28, 2014, to inspect the work for acceptance and develop a punch list of remaining work items to be completed. The following punch list was developed:

- The irrigation drip-line in CWCMH parking lot landscape area needed to be tacked down.
- Vegetation in CWCMH landscape needed to be established when conditions are appropriate.
- The north side of Frank Wear treatment system compound fence needed to be cleaned. The fence was dirtied as a result of ERRG power washing parking lot.
- The injection well trench on north side of Frank Wear treatment system compound fence needed to be brought to grade with appropriate fill material.
- Surface material needed to be graded. A monitoring well was buried with about 4 inches of soil. There was exposed soil around the EXT-1 well vault.
- Temporary fencing stored in the Frank Wear compound required removal.
- Any and all keys to either the Frank Wear compound or injection well parking lot needed to be returned.

Most of the items above were addressed by ERRG to the satisfaction of Ecology and Hart Crowser with the exception of placement of the irrigation drip line and establishing the vegetation in the CWCMH landscape. Ecology issued a Notice of Warranty Repair to ERRG on October 10, 2014, requesting that ERRG address these issues.

6.4 Record Drawings

Survey data was collected by PLSA throughout the initial, intermediate, and final stages of the construction work and is described in Section 4.6. A final survey was also completed to document the location and elevation of the GTS building concrete pad, and locations of the injection/extraction wells and the new fencing that was installed. Survey results were forwarded to Hart Crowser and incorporated into the As-Built Drawings in Appendix A.

7.0 CONSTRUCTION COMPLETION SCHEDULE AND ISSUES

Construction activities were generally completed within the schedule and durations provided by ERRG at the beginning of the project. Although several components of the work were modified as described in previous sections of this report, the groundwater recirculation system installation was completed on November 20, 2013, with Site restoration activities completed in March 2014.

All of the issues that arose during the various stages of construction were generally resolved due to the collaboration of Ecology, Hart Crower, and ERRG. Change orders were issued accordingly as described in Section 5.1. The remaining issue is the Site restoration to be completed by ERRG in the CWCMH landscape area as described in Section 6.3.

Per WAC 173-340-400(6)(b)(ii) it is our opinion that based on testing results and inspections of the work, the Phase 1 groundwater interim action has been constructed in substantial compliance with the Contract Plans and Specifications and related documents.

8.0 REFERENCES

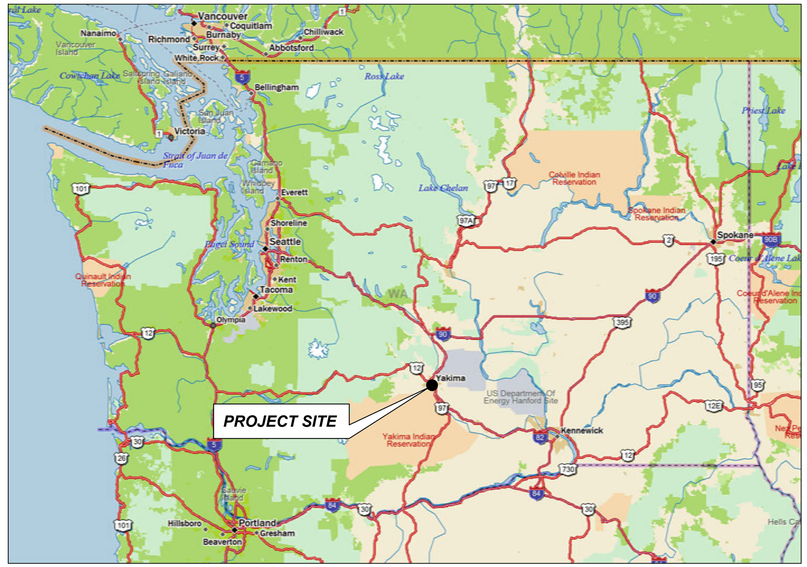
Hart Crowser 2007. Feasibility Study Report, Frank Wear, Yakima, Washington. July 31, 2007.

Hart Crowser 2012. Data Gap Investigation Report, Frank Wear Site, Yakima, Washington. September 18, 2012.

Hart Crowser 2013. Draft Interim Action Plan. Former Frank Wear Cleaners Site, Yakima, Washington. March 11, 2013.

APPENDIX A
As-Built Drawings

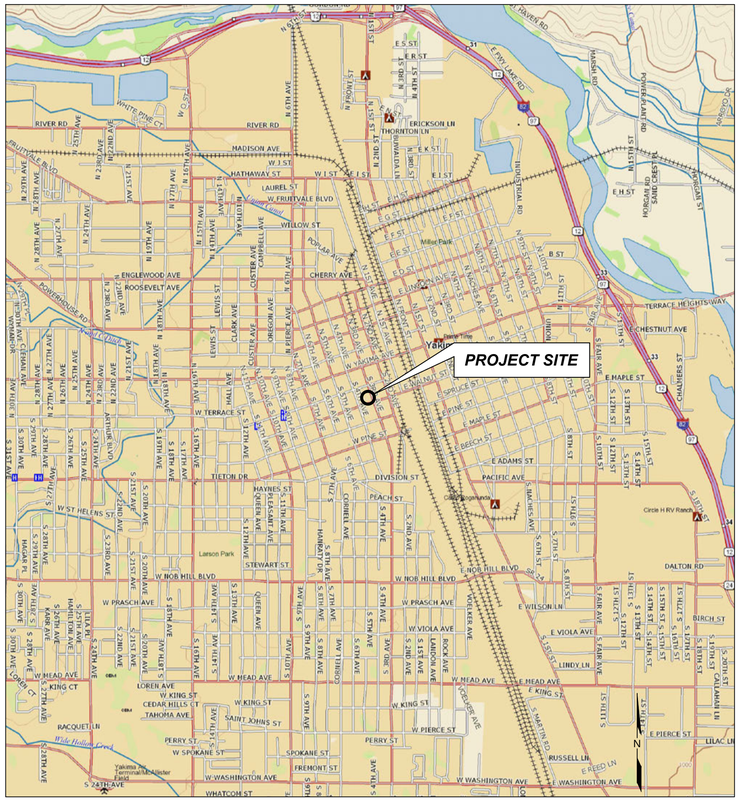
WASHINGTON STATE DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER REMEDIATION SYSTEM
PHASE I - AS-BUILTS
YAKIMA, WASHINGTON



REGIONAL MAP

DRAWING INDEX:

SHEET 1	-	COVER SHEET
SHEET 2	-	GROUNDWATER REMEDIATION SYSTEM LAYOUT
SHEET 3	-	ENLARGED SITE PLAN
SHEET 4	-	ENLARGED SITE PLAN AND TRENCH DETAIL
SHEET 5	-	EXTRACTION WELL TRENCH DETAILS
SHEET 6	-	INJECTION WELL TRENCH DETAILS
SHEET 7	-	VAULT DETAILS
SHEET 8	-	INJECTION WELL DETAILS
SHEET 9	-	EXTRACTION WELL DETAILS



Source: DeLorme Topo USA®.

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Scale in Feet

VICINITY MAP

HARTCROWSER

Mark	Description	Date	Appr.

Designed by: JAK | Date: 11/25/14 | Rev. 1
Dwn by: MAS | Ckd by: CM | Job Number: 17800-23
Reviewed by: JAK | : : | : :
Submitted by: HART CROWSER, INC. | File name: F:\Data\Jobs\WA Ecology\17800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800-23-001 (Cover Sheet).dwg | Plot scale: SEE DRAWING

JILL ANN KIERNAN — STATE OF WASHINGTON — 46834 — CIVIL — PROFESSIONAL ENGINEER
11-25-14

AS-BUILTS

DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON
COVER SHEET

Sheet Reference Number:
1
Sheet 1 of 9

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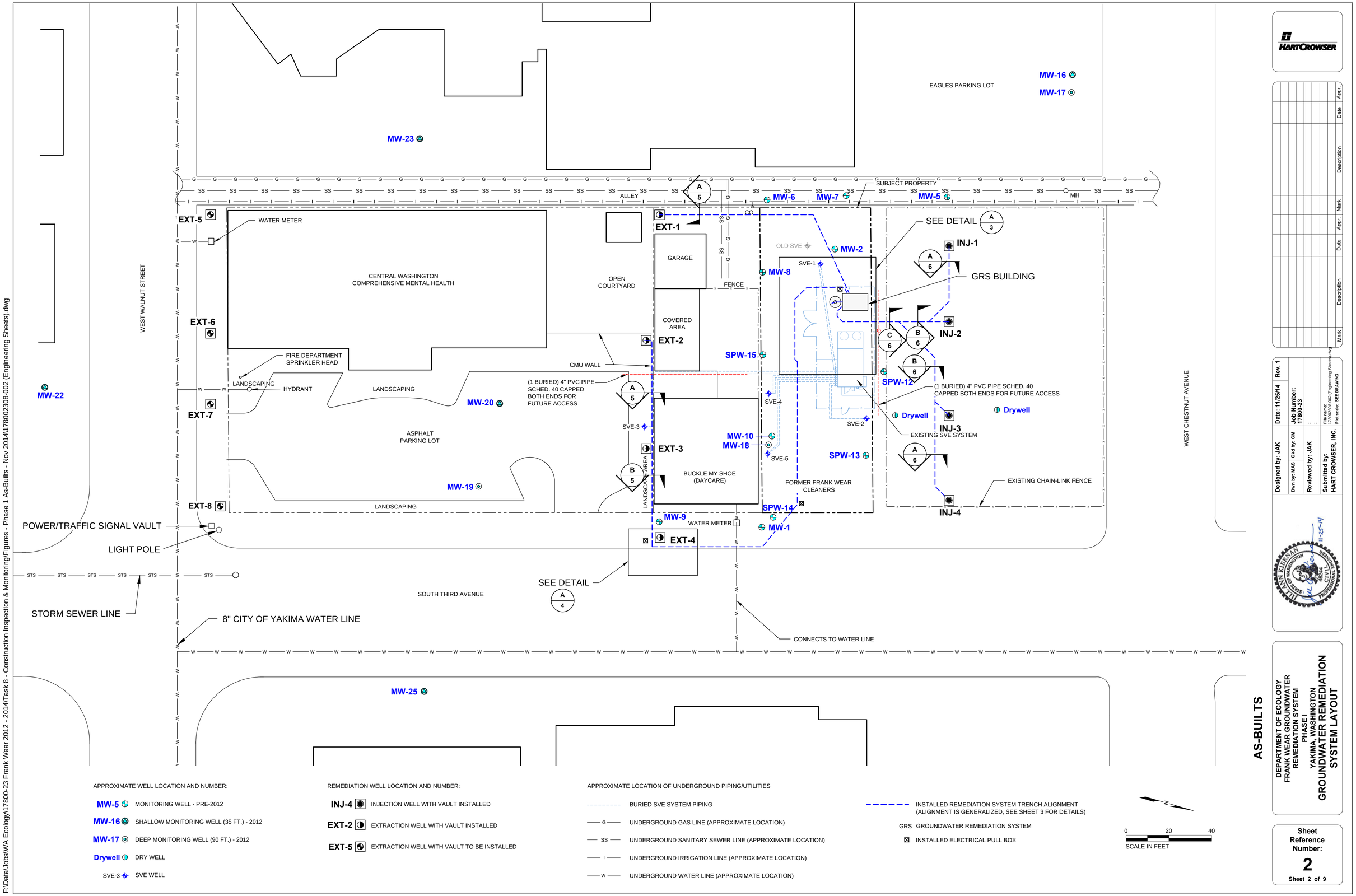


APPROXIMATE WELL LOCATION AND NUMBER:

- MW-5 — MONITORING WELL - PRE-2012
- MW-16 — SHALLOW MONITORING WELL (35 FT.) - 2012
- MW-17 — DEEP MONITORING WELL (90 FT.) - 2012
- Drywell — DRY WELL
- SVE-3 — SVE WELL

REMEDIATION WELL LOCATION AND NUMBER:

- INJ-4 — INJECTION WELL WITH VAULT INSTALLED
- EXT-2 — EXTRACTION WELL WITH VAULT INSTALLED
- EXT-5 — EXTRACTION WELL WITH VAULT TO BE INSTALLED

APPROXIMATE LOCATION OF UNDERGROUND PIPING/UTILITIES

- BURIED SVE SYSTEM PIPING
- G — UNDERGROUND GAS LINE (APPROXIMATE LOCATION)
- SS — UNDERGROUND SANITARY SEWER LINE (APPROXIMATE LOCATION)
- I — UNDERGROUND IRRIGATION LINE (APPROXIMATE LOCATION)
- W — UNDERGROUND WATER LINE (APPROXIMATE LOCATION)
- INSTALLED REMEDIATION SYSTEM TRENCH ALIGNMENT (ALIGNMENT IS GENERALIZED, SEE SHEET 3 FOR DETAILS)
- GRS GROUNDWATER REMEDIATION SYSTEM
- INSTALLED ELECTRICAL PULL BOX

0 20 40
SCALE IN FEET

AS-BUILTS

DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON

GROUNDWATER REMEDIATION SYSTEM LAYOUT

Sheet Reference Number: **2**

Sheet 2 of 9

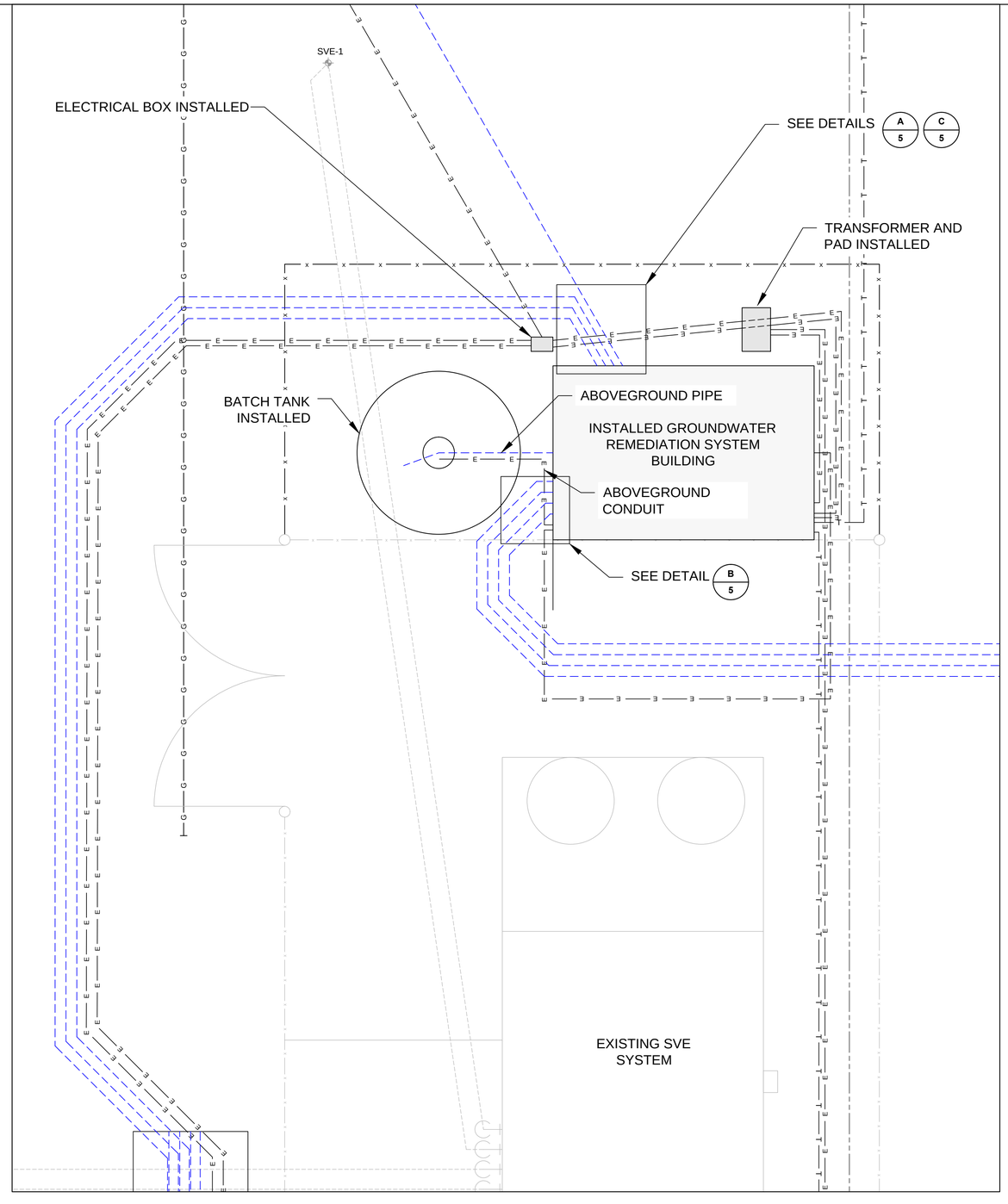
HARTCROWSER

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Date: 11/25/14 | Rev. 1
Job Number: 17800-23
Designed by: JAK | Cad by: CM
Dwn by: MAS | Chk by: JAK
Reviewed by: JAK
File name: F:\Data\Jobs\WA Ecology\117800-002 (Engineering Sheets).dwg
Plot scale: SEE DRAWING
Submitted by: HART CROWSER, INC.

F:\Data\Jobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\117800230-002 (Engineering Sheets).dwg



REMEDIATION WELL LOCATION AND NUMBER:

EXT-8 EXTRACTION WELL WITH VAULT INSTALLED

INSTALLED REMEDIATION SYSTEM PIPE

E INSTALLED ELECTRICAL CONDUIT AND WIRE

T INSTALLED TELEPHONE CONDUIT AND WIRE

G EXISTING GAS LINE ABANDONED BY CASCADE NATURAL GAS, TO BE REMOVED AS NEEDED

x INSTALLED FENCE

INSTALLED EXTRACTION WELL PIPING REMEDIATION BUILDING CONNECTION A/3

0 3 6

SCALE IN FEET

HARTCROWSER

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Designed by: JAK | Date: 11/25/14 | Rev. 1

Dwn by: MAS | Ckd by: CM | Job Number: 17800-23

Reviewed by: JAK | .. | ..

Submitted by: HART CROWSER, INC. | File name: F:\Data\Jobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800308-004 (Enlarged Site Plan).dwg | Plot scale: SEE DRAWING

STATE OF WASHINGTON JILL ANN KIERNAN 46624 CIVIL PROFESSIONAL ENGINEER

11-25-14

AS-BUILTS

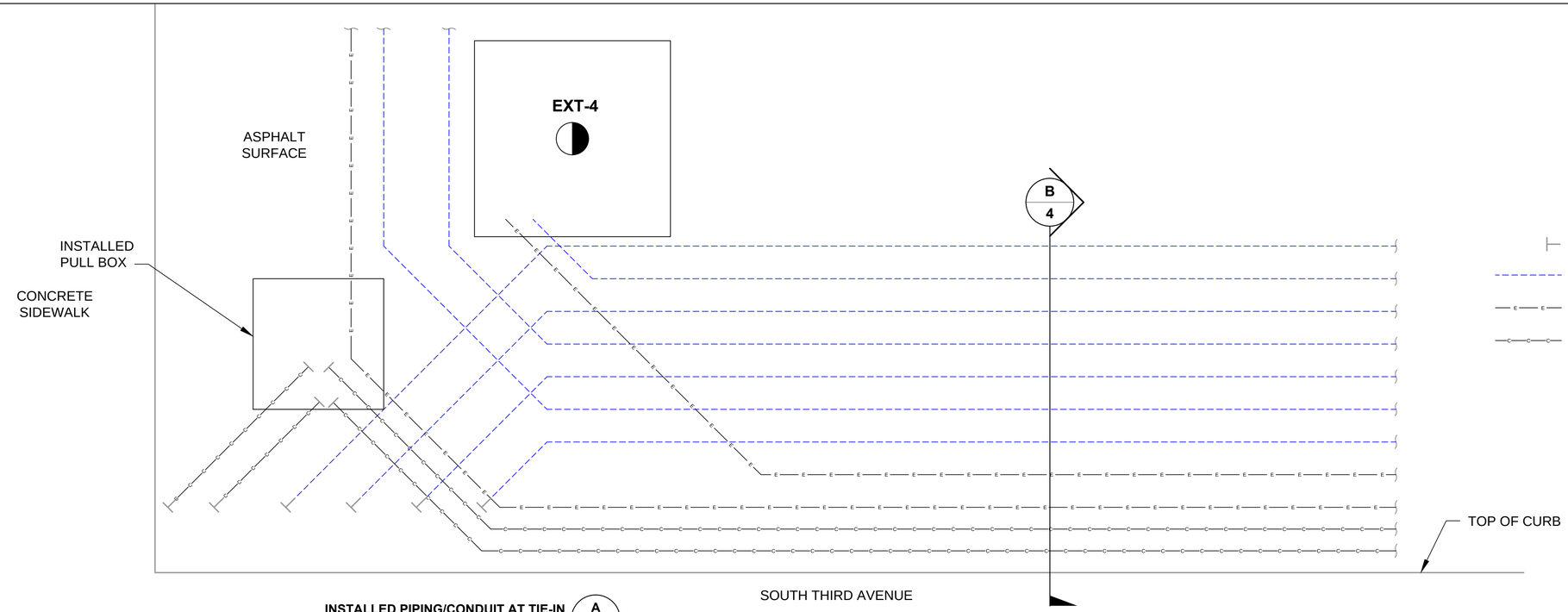
DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON

ENLARGED SITE PLAN

Sheet Reference Number: 3

Sheet 3 of 9

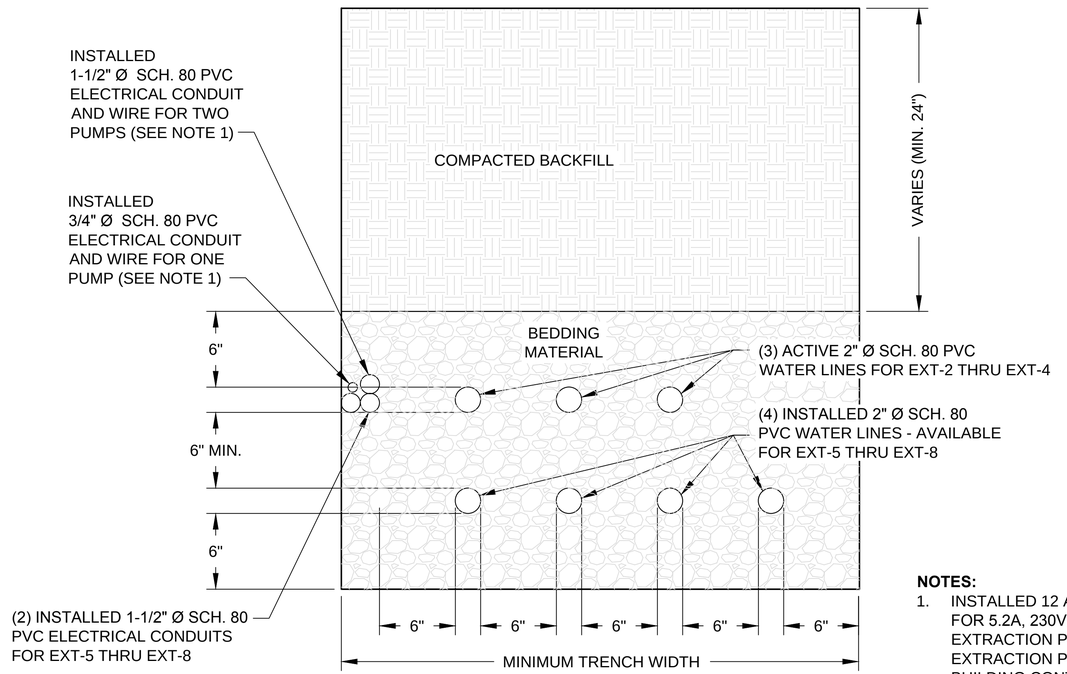
F:\Data\Jobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800308-004 (Enlarged Site Plan).dwg



INSTALLED PIPING/CONDUIT AT TIE-IN A/4

0 0.5 1

SCALE IN FEET



TRENCH DETAIL 5 (SEVEN WELLS) B/4

0 0.5 1

SCALE IN FEET

NOTES:

1. INSTALLED 12 AWG ELECTRICAL WIRE FOR 5.2A, 230V, 1" Ø SUBMERSIBLE EXTRACTION PUMPS. CONNECTED EXTRACTION PUMPS TO REMEDIATION BUILDING CONTROL PANEL.

HARTCROWSER

Mark	Description	Date	Appr.	Mark	Description	Date	Appr.

F:\Data\Jobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800308-004 (Enlarged SP and Extract Well Trench Det).dwg

Designed by: JAK | Dwn by: MAS | Ckd by: CM
Reviewed by: JAK
Submitted by: HART CROWSER, INC.
Date: 11/25/14 | Rev. 1
Job Number: 17800-23
File name: F:\Data\Jobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800308-004 (Enlarged SP and Extract Well Trench Det).dwg
Plot scale: SEE DRAWING

JILL ANN KIERMAN — STATE OF WASHINGTON — 46244 — CIVIL ENGINEER — PROFESSIONAL — 11-25-14

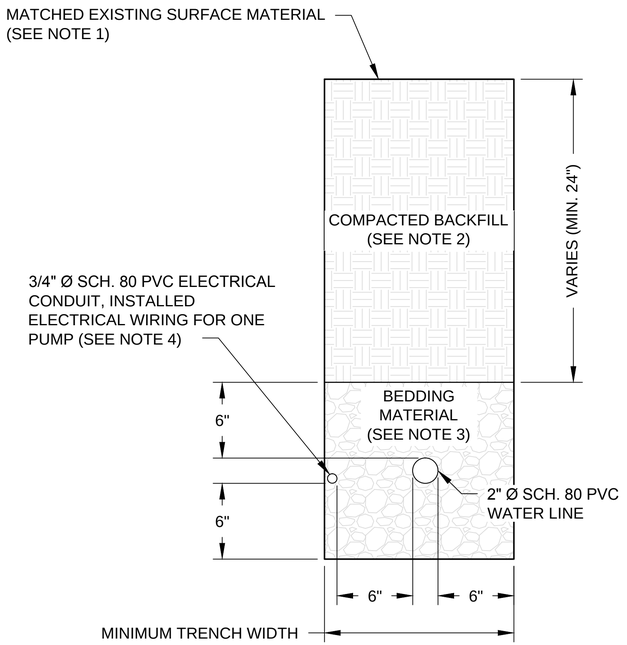
AS-BUILTS

DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON

ENLARGED SITE PLAN AND TRENCH DETAIL

Sheet Reference Number: **4**

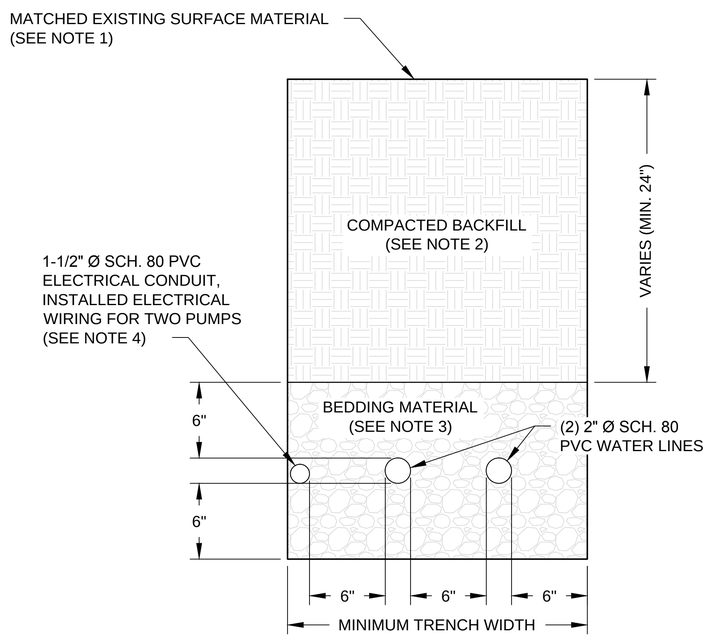
Sheet 4 of 9



TRENCH DETAIL 1 (ONE WELL) — A / 5

0 0.5 1

SCALE IN FEET



TRENCH DETAIL 2 (TWO WELLS) — B / 5

0 0.5 1

SCALE IN FEET

NOTES:

1. SURFACE RESTORATIONS IN PUBLIC RIGHT OF WAY INSTALLED TO CITY OF YAKIMA STANDARDS FOR RESURFACING.
2. BACKFILL IS 3/4"-0 GRANULAR CRUSHED ROCK COMPACTED TO 95% MAXIMUM DENSITY ON ROADWAYS/EXISTING PAVED AREAS OR TO 90% MAXIMUM DENSITY IN ALL OTHER AREAS.
3. BEDDING MATERIAL IS 3/4"-0 AGGREGATE COMPACTED TO 90% MAXIMUM DENSITY.
4. INSTALLED 12 AWG ELECTRICAL WIRE FOR 5.2A, 230V, 1" Ø SUBMERSIBLE EXTRACTION PUMPS. CONNECTED EXTRACTION PUMPS TO REMEDIATION BUILDING CONTRAL PANEL.

HARTCROWSER

Mark	Description	Date	Appr.	Mark	Description	Date	Appr.

Designed by: JAK | Date: 11/25/14 | Rev. 1
Drwn by: MAS | Ckd by: CM | Job Number: 17800-23
Reviewed by: JAK | : : | : :
Submitted by: HART CROWSER, INC. | File name: I:\800-005 (Extract Well Trench Details)3.dwg | Plot scale: SEE DRAWING

AS-BUILTS

DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER
REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON

EXTRACTION WELL TRENCH DETAILS

Sheet Reference Number: **5**

Sheet 5 of 9

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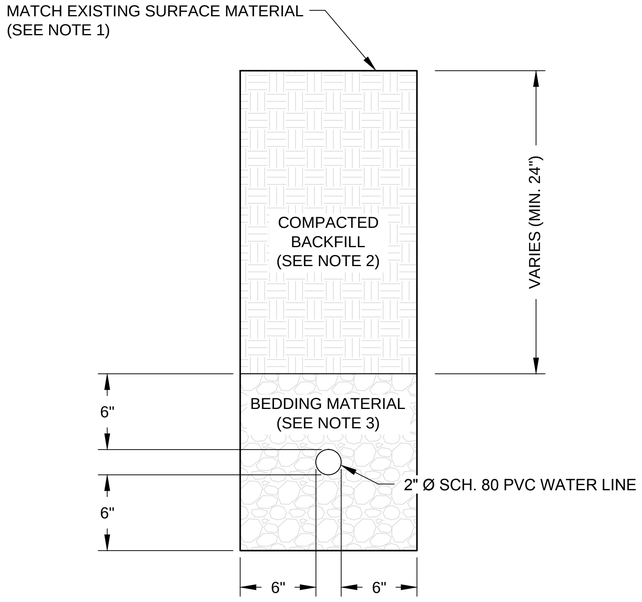
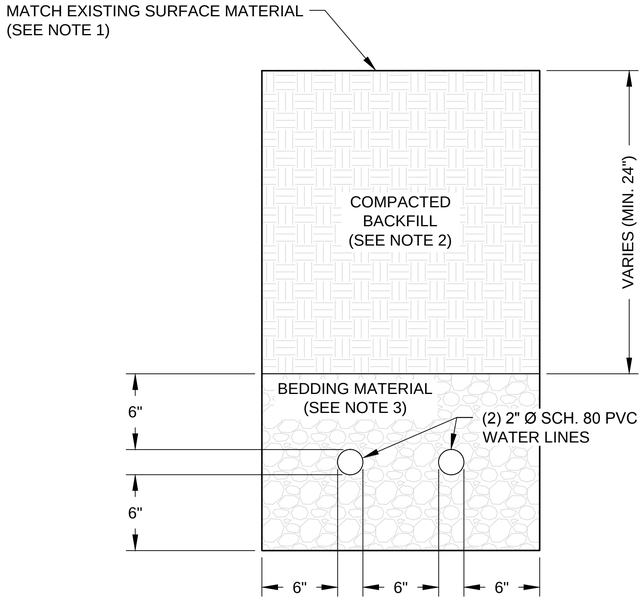


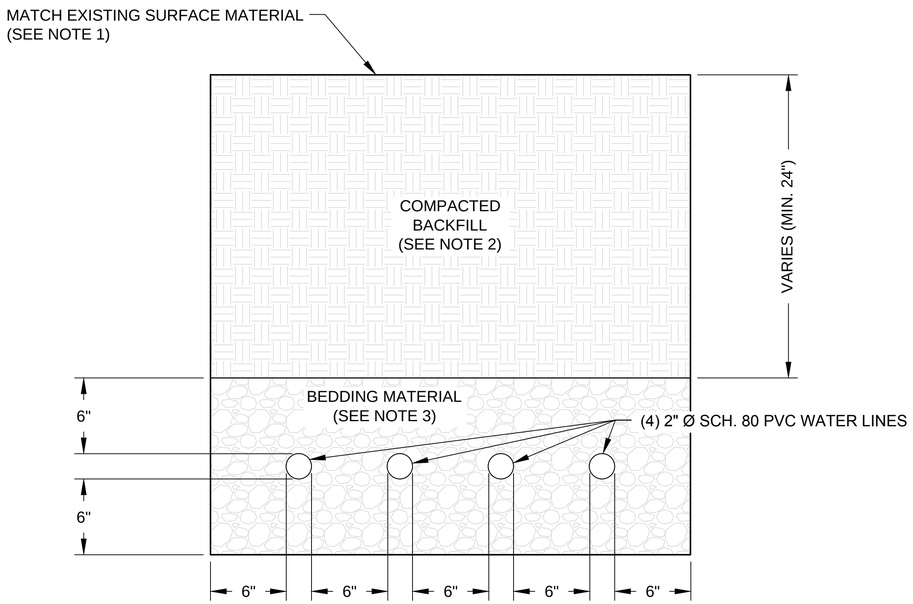
TRENCH DETAIL 1 (ONE WELL) — A / 6

0 0.5 1
SCALE IN FEET



TRENCH DETAIL 2 (TWO WELLS) — B / 6

0 0.5 1
SCALE IN FEET



TRENCH DETAIL 4 (FOUR WELLS) — C / 6

0 0.5 1
SCALE IN FEET

NOTES:

1. SURFACE RESTORATIONS IN PUBLIC RIGHT OF WAY INSTALLED TO CITY OF YAKIMA STANDARDS FOR RESURFACING.
2. BACKFILL IS 3/4"-0 GRANULAR CRUSHED ROCK COMPACTED TO 95% MAXIMUM DENSITY ON ROADWAYS/EXISTING PAVED AREAS AND TO 90% MAXIMUM DENSITY IN ALL OTHER AREAS.
3. BEDDING MATERIAL IS 3/4"-0 AGGREGATE COMPACTED TO 90% MAXIMUM DENSITY.

HARTCROWSER

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

AS-BUILTS

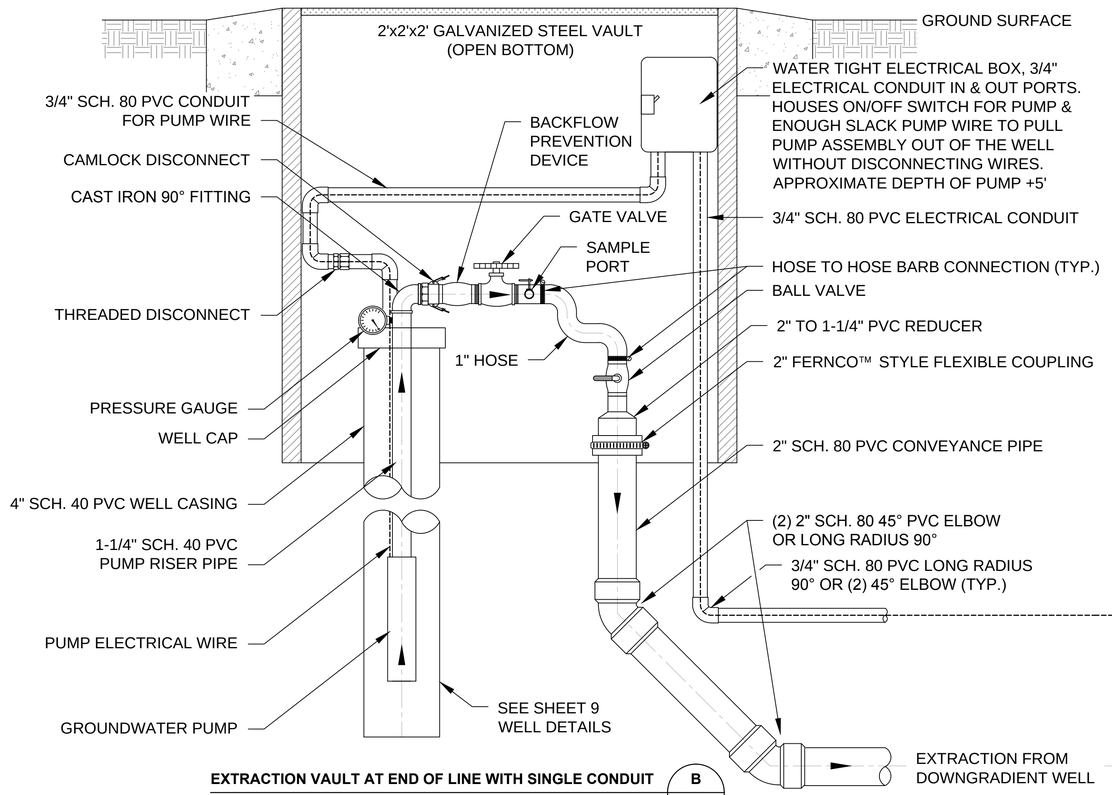
DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER
REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON
INJECTION WELL
TRENCH DETAILS

Designed by: JAK | Date: 11/25/14 | Rev. 1
Dwn by: MAS | Ckd by: CM
Reviewed by: JAK | Job Number: 117800-23
Submitted by: HART CROWSER, INC.
File name: F:\DataJobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800-006 (In) Well Trench Details).dwg
Plot scale: SEE DRAWING

JILL ANN KIERMAN
STATE OF WASHINGTON
48244
CIVIL ENGINEER
PROFESSIONAL
11-25-14

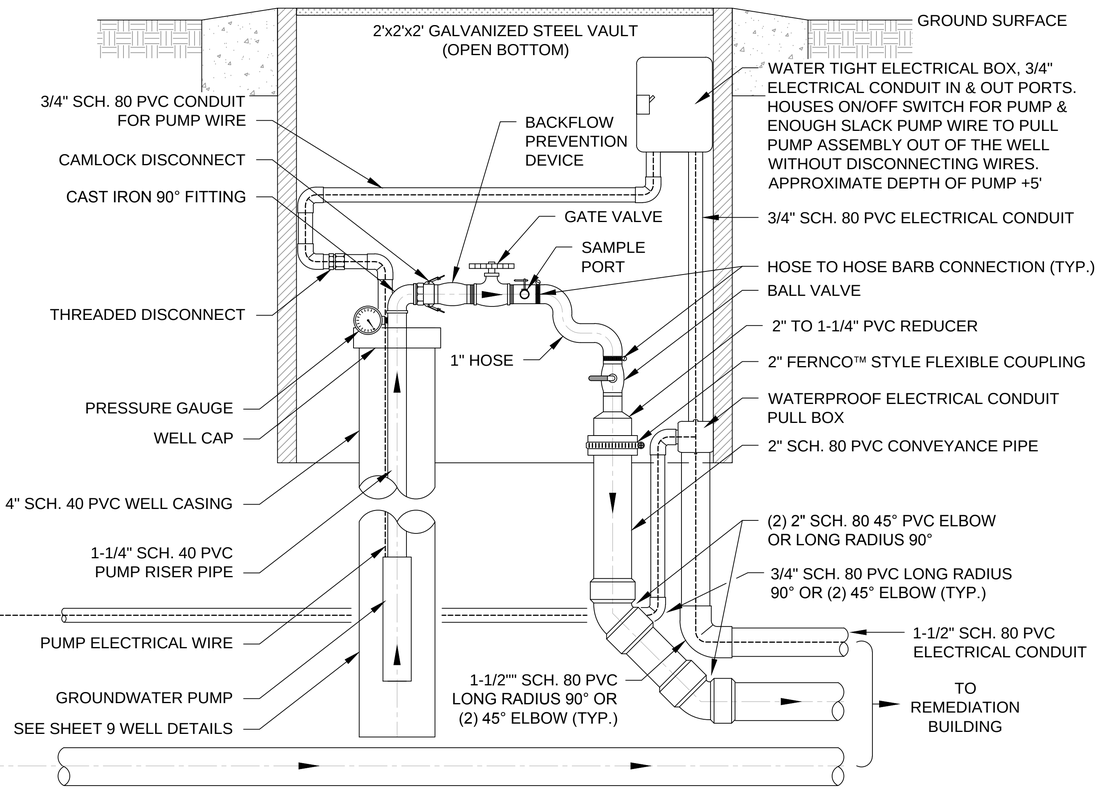
Sheet Reference Number:
6
Sheet 6 of 9

F:\DataJobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800-006 (In) Well Trench Details).dwg



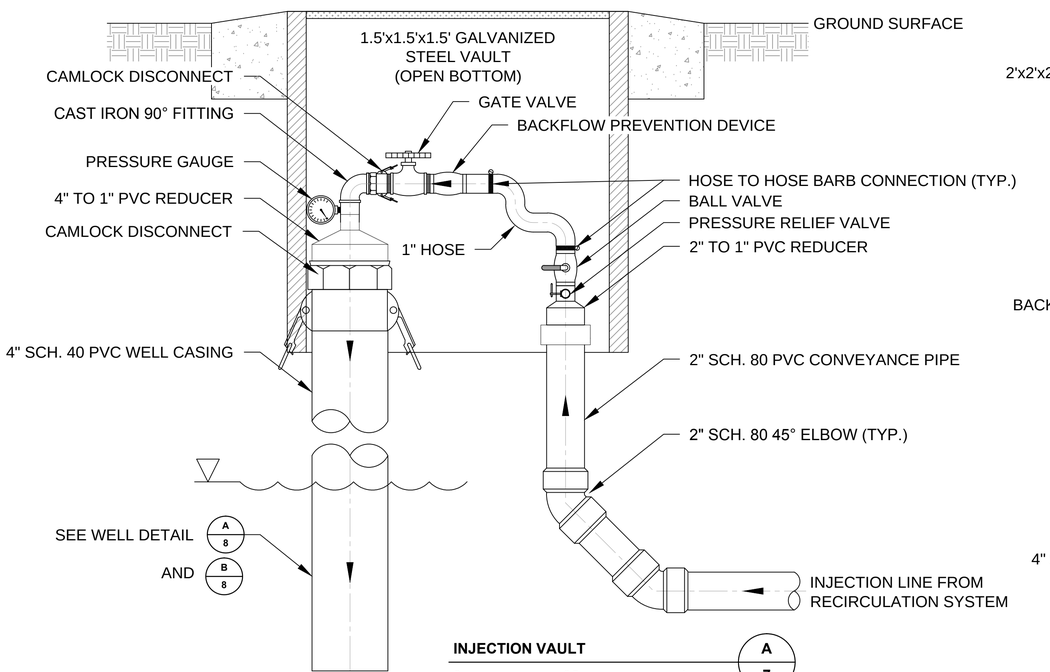
EXTRACTION VAULT AT END OF LINE WITH SINGLE CONDUIT — B / 7

0 0.5 1
SCALE IN FEET



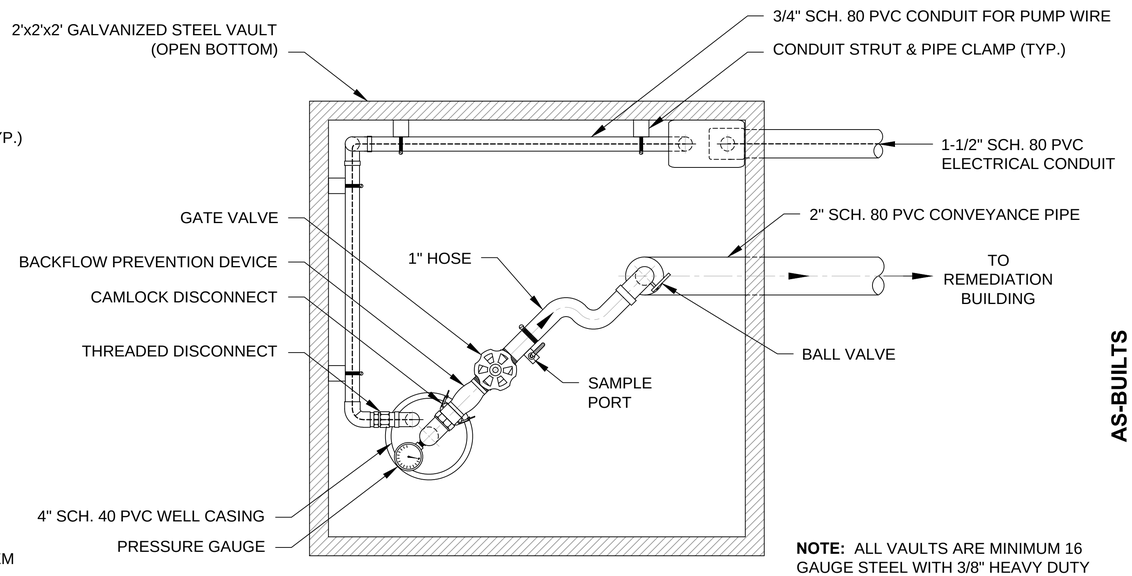
EXTRACTION VAULT WITH SHARED ELECTRICAL CONDUIT — C / 7

0 0.5 1
SCALE IN FEET



INJECTION VAULT — A / 7

0 0.5 1
SCALE IN FEET



TYPICAL VAULT PLAN VIEW — D / 7

0 0.5 1
SCALE IN FEET

NOTE: ALL VAULTS ARE MINIMUM 16 GAUGE STEEL WITH 3/8" HEAVY DUTY DIAMOND PLATE LID. LIDS ARE LOCKING, WATER-RESISTANT WITH LIFT ASSIST. VAULTS MEET AASHTO H20 WHEEL LOADING SPECIFICATION.

AS-BUILTS

DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER
REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON

VAULT DETAILS

Mark	Description	Date	Apprv.

Date: 11/25/14 | Rev. 1
Designed by: JAK | Job Number: 17800-23
Dwn by: MAS | Ckd by: CM
Reviewed by: JAK
Submitted by: HART CROWSER, INC.
File name: F:\Data\Jobs\WA Ecology\17800-23\007 (Vault Details).dwg
Plot scale: SEE DRAWING

JILL ANN KIERNAN — STATE OF WASHINGTON — 46244 — CIVIL — PROFESSIONAL ENGINEER
11-25-14

Sheet Reference Number: **7**
Sheet 7 of 9

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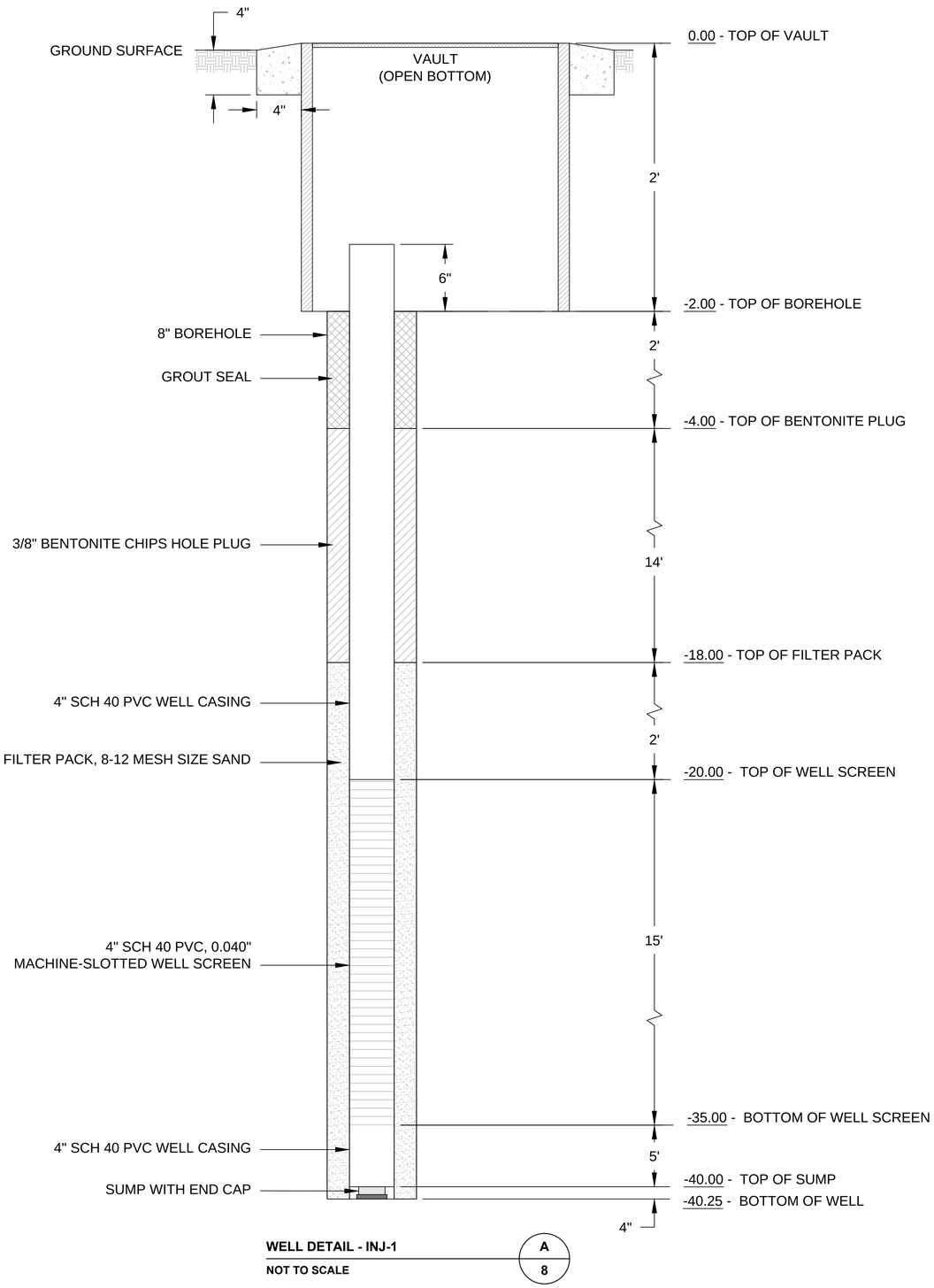
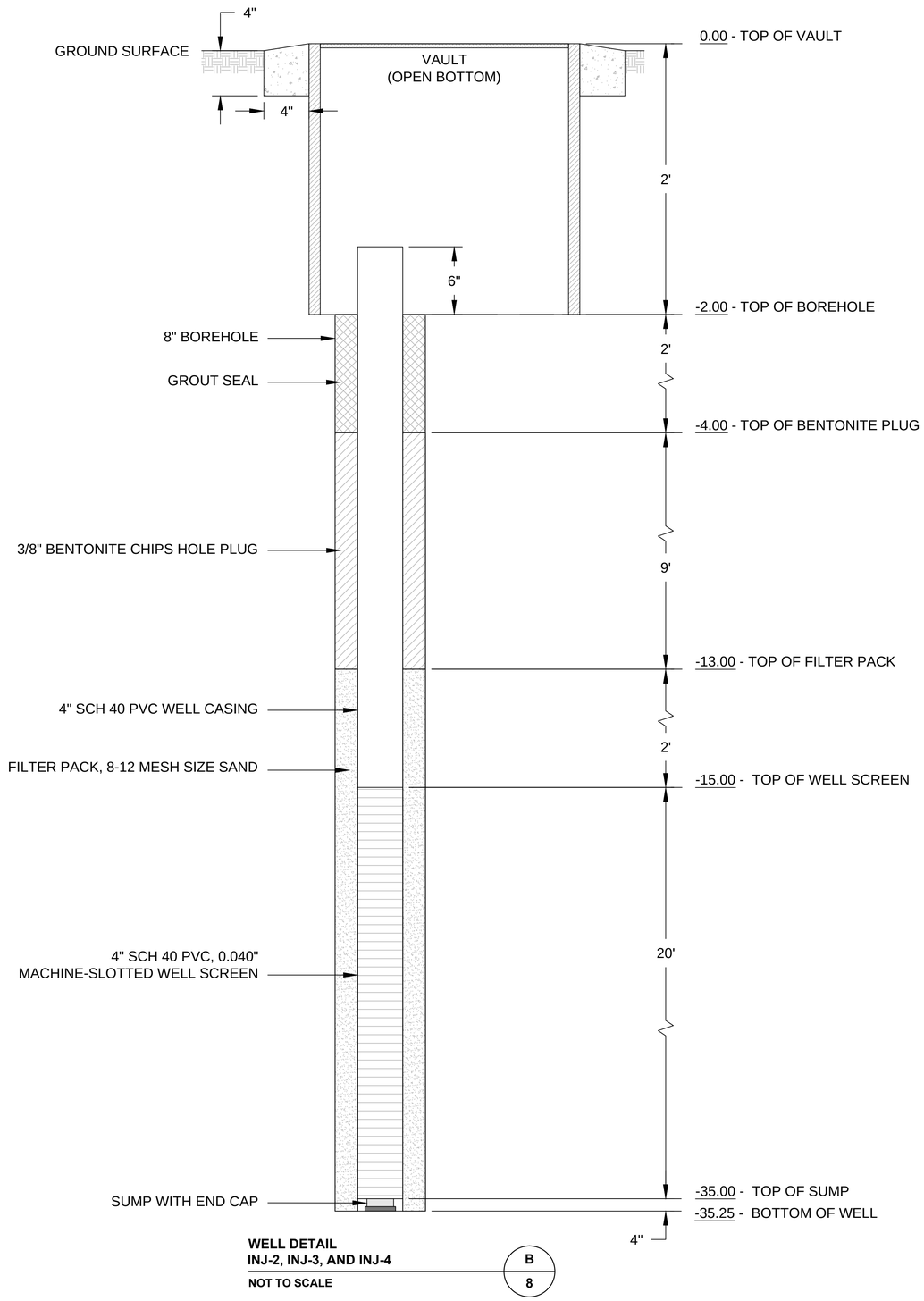


WELL DETAIL - INJ-1
NOT TO SCALE
A / 8



WELL DETAIL
INJ-2, INJ-3, AND INJ-4
NOT TO SCALE
B / 8

HARTCROWSER

Mark	Description	Date	Appr.

Designed by: JAK | Date: 11/25/14 | Rev. 1
Dwn by: MAS | Ckd by: CM | Job Number: 17800-23
Reviewed by: JAK | File name: F:\Data\Jobs\WA Ecology\17800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 20141780023\08 (Well Details).dwg | Plot scale: SEE DRAWING
Submitted by: HART CROWSER, INC.

LILLIANN KIERNAN — STATE OF WASHINGTON — 40544 — CIVIL — PROFESSIONAL ENGINEER
11-25-14

AS-BUILTS

DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER
REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON

iNJECTION WELL DETAILS

Sheet Reference Number:
8
Sheet 8 of 9

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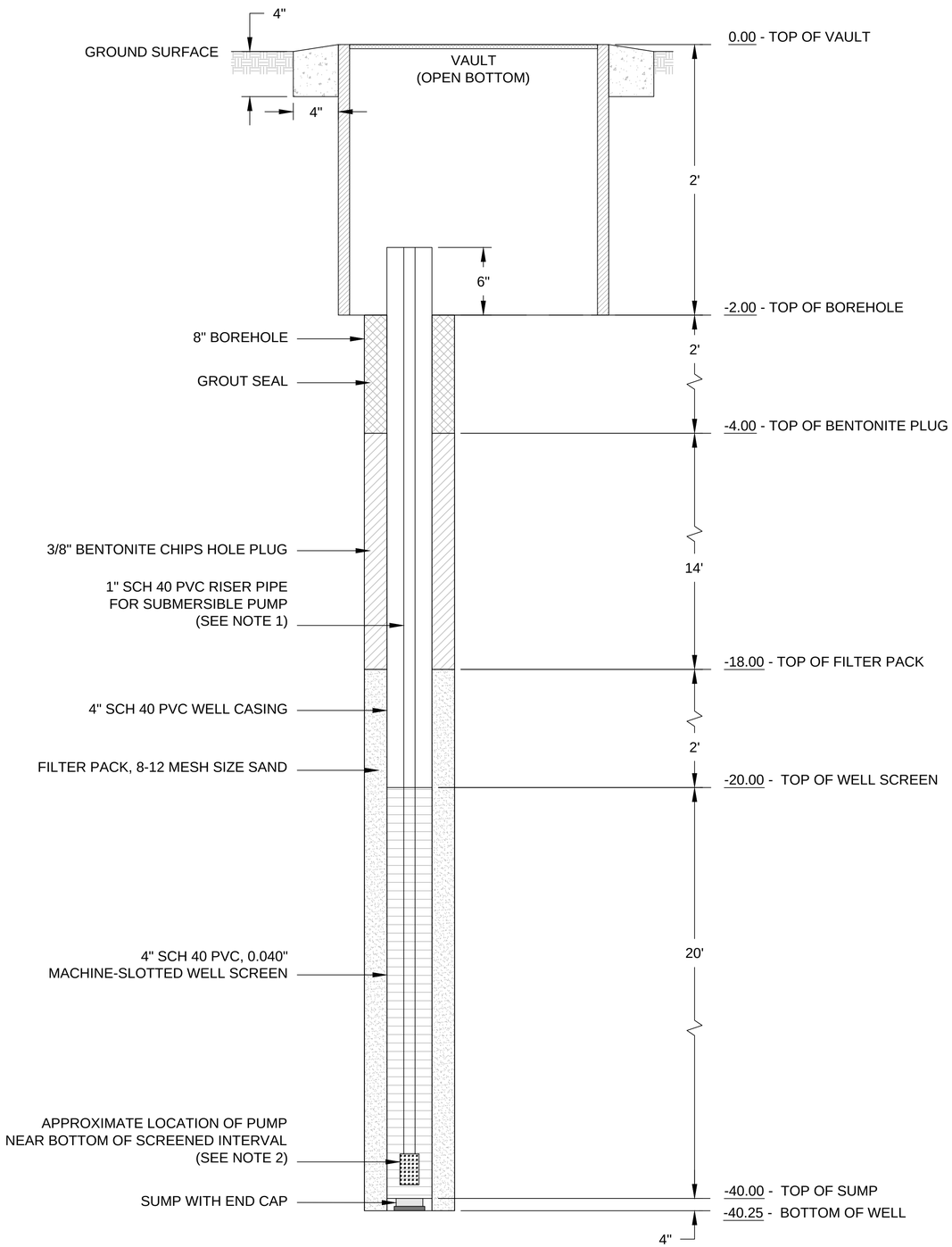


EXTRACTION WELL DETAIL
EXT-1 THRU EXT-8
NOT TO SCALE

A
9

NOTES:

1. INSTALLED 1-1/4" SCH. 40 PVC RISER PIPE IN EXTRACTION WELLS EXT-1 THRU EXT-4.
2. INSTALLED EXTRACTION PUMPS IN EXT-1 THRU EXT-4.
3. VAULTS, RISER PIPE, AND EXTRACTION PUMPS TO BE INSTALLED IN EXTRACTION WELLS EXT-5 THRU EXT-8 AS PART OF PHASE II WORK.

HARTCROWSER

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Designed by: JAK | Date: 11/25/14 | Rev. 1
Dwn by: MAS | Ckd by: CM | Job Number: 17800-23
Reviewed by: JAK | : : | : :
Submitted by: HART CROWSER, INC. | File name: F:\Data\Jobs\WA Ecology\117800-23\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800-008 (Well Details).dwg | Plot scale: SEE DRAWING

JILL ANN KIERMAN | STATE OF WASHINGTON | 46244 | CIVIL ENGINEER | PROFESSIONAL | 11-25-14

AS-BUILTS

DEPARTMENT OF ECOLOGY
FRANK WEAR GROUNDWATER
REMEDIATION SYSTEM
PHASE I
YAKIMA, WASHINGTON

EXTRACTION WELL DETAILS

Sheet Reference Number:
9
Sheet 9 of 9

F:\Data\Jobs\WA Ecology\117800-23 Frank Wear 2012 - 2014\Task 8 - Construction Inspection & Monitoring\Figures - Phase 1 As-Builts - Nov 2014\17800-008 (Well Details).dwg

APPENDIX B
Contractor Submittal Approvals

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	10/7/2013	001

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 00 73 00	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☐ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
1	Construction Schedule		Electronic	3.02 B				

REMARKS

Please incorporate comments received from Jason Shira (Ecology) via e-mail on October 8, 2013 (attached) and revise accordingly.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	October 17, 2013

REVIEWED
BY Jill Kiernan
DATE 10/17/13

Jill Kiernan

From: Shira, Jason (ECY) [JSHI461@ECY.WA.GOV]
Sent: Tuesday, October 08, 2013 3:34 PM
To: Matt Hooper; Jill Kiernan
Cc: Kristan Hinds; Randy Randall
Subject: RE: Frank Wear Submittal 001 - Construction Schedule

Hi Matt,
Thanks for the schedule. Few things that pop-out to me:

- CQC – there is a late date of 11/27/13 attached to the task. Div 01 Section 45 Part 1.05 A.1.c stipulates within 7-days after Notice to Proceed i.e. 10/14/13.
- Include/identify in the Project Schedule:
  - Securing the project area between Mobilization and Install Remediation Blg (ID 14 – 34). Div 01 Section 50 Part 1.03 G.
    - Although the specifics in this section may not apply we need to consider the project plan and maintaining a safe and secure project area. For example, INJ-1 thru 4 are located in a fenced-in parking lot that must remain secure throughout the life of our project.
  - Restoration of Landscaping in the Site Restoration Task (41)

--Jason

Jason Shira | Toxics Cleanup Program | Central Regional Office | State of Washington Department of Ecology
15 W. Yakima Ave -- Suite 200 Yakima, WA 98902-3452 | phone: (509) 454-7834 | fax: (509) 575-2809

jason.shira@ecy.wa.gov

From: Matt Hooper [mailto:matt.hooper@errg.com]
Sent: Monday, October 07, 2013 5:02 PM
To: Shira, Jason (ECY); Jill Kiernan (Jill.Kiernan@hartcrowser.com)
Cc: Kristan Hinds; Randy Randall
Subject: Frank Wear Submittal 001 - Construction Schedule

Jason, Jill,

Attached is the preliminary construction schedule for the Frank Wear GWRS project. The file is in PDF and MS Project format.

Matt Hooper
Project Engineer
ENGINEERING/REMEDIATION RESOURCES GROUP, INC.
616 First Ave., Suite 300, Seattle, WA 98104
Direct: 206.512.3171 I Fax: 206.282.4789
matt.hooper@errg.com
www.errg.com

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	10/14/2013	002

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 01 45 00	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type, size, model number, etc.)	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
1	Construction Quality Control (CQC) Plan		Electronic	1.05				

REMARKS Please incorporate the following and revise accordingly:
1. Section 5.2, Page 5-1. The reference to Section 4.3 at the end of the paragraph should be corrected to Section 4.1.
2. Table 2, Well Head Assemblies and Well Piping: Items b.i and b.ii. The referenced specifications for vault bedding and backfill should be corrected to Section 02 71 16.
3. Appendix C, Submittal Log. Please include Soil Stockpile Layout in Specification Section 31 14 13 1.02 as a line item.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	October 17, 2013

REVIEWED
BY Jill Kiernan
DATE 10/17/13

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	10/16/2013	003

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 02 71 16	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
1	Well Vaults		Electronic	2.01	7			

REMARKS

Reviewed and Approved

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc	October 16, 2013

REVIEWED
BY Jill Kiernan
DATE 10/16/13

REVIEWED
BY Jill Kiernan
DATE 10/25/13
Reviewed and accepted

Temporary Facilities and Controls Work Plan for Former Frank Wear Cleaners – Groundwater Remediation System Yakima, Yakima County, Washington

October 2013

ERRG Project No. 2013-086

Prepared for:

State of Washington, Department of Ecology
15 West Yakima Ave, Suite 200
Yakima, WA 98902-3452

Prepared by:

ERRG

Engineering/Remediation Resources Group, Inc.
616 First Avenue, Suite 300
Seattle, Washington 98104
(206) 282-4749

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE 10/22/2013	TRANSMITTAL NO. 005

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 26 05 00	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
1	Conduit and fittings		Electronic	1.04				
2	Connectors, covers, boxes		Electronic	1.04				
3	Anchorage components		Electronic	1.04				
4	Wire		Electronic	1.04				
5	Switches		Electronic	1.04				

REMARKS

Reviewed and accepted.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	October 25, 2013

REVIEWED
BY: Jill Kiernan
DATE: 10/25/13

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	10/25/2013	007

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 03 31 00	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
1	Structural Concrete		Electronic	Part 2				
2	Structural Fiber Mesh		Electronic	2.02 - 2.03				

REMARKS

The fiber mesh is being submitted as a substitute for steel reinforcing.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
Reviewed and Accepted	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	October 29, 2013

REVIEWED
BY Jill Kiernan
DATE 10/29/13

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	10/29/2013	009

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
1	2-in. Schedule 80 PVC Pipe and Fittings		Electronic	2.02 - 2.03				
2	PVC Primer and Glue		Electronic	NA				
3	Marking Tape		Electronic	2.04B				
4	Pipe Tape		Electronic	NA				
5	Tracer Wire and Connectors		Electronic	2.04A				

REMARKS

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
Reviewed and Accepted	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	October 29, 2013

REVIEWED
BY Jill Kiernan
DATE 10/29/13

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	11/13/2013	010

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 32 01 17	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
1	Hot-Mix Asphalt Job Mix Design		Electronic	1.03A1				
2	Placement Methods and Sequence		Electronic	1.03A2				

REMARKS

Reviewed and accepted

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	November 14, 2013

REVIEWED
BY Jill Kiernan
DATE 11/14/13

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	12/3/2013	013

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 02 71 13	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT SPEC. PARA. NO.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO.	FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
1	Pipe Insulation		Electronic	2.06				

REMARKS

Reviewed and accepted.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	December 4, 2013

REVIEWED
BY Jill Kiernan
DATE 12/4/13

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE	TRANSMITTAL NO.
	12/3/2013	014

Section I – REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS

TO:	FROM:	CONTRACT NO.	CHECK ONE:
State of Washington Department of Ecology 15 W. Yakima Ave,Suite 200 Yakima, WA 98902-3452	Engineering/Remediation Resources Group, Inc. 616 First Avenue, Suite 300 Seattle, WA 98104	C1400084	☑ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL__
SPEC. NO 03 31 00	PROJECT TITLE AND LOCATION: Former Frank Wear Cleaners - Groundwater Remediation System Yakima, WA		CHECK ONE: THIS TRANSMITTAL IS FOR ☐ FIO ☑ REVIEW AND APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type, size, model number, etc.)*	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO.	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION	FOR CE USE CODE
				SPEC. PARA. NO.	DRAWING SHEET NO.			
1	Proposed clips for anchoring remediation building		Electronic	N/A				
2	Anchor bolts for building/transformer		Electronic	2.03				

REMARKS

As we discussed today, the use of 3/8-inch bolts, one per clip installed at the center of the clip is acceptable. The 3/8-inch bolts can either be the wedge anchor type as shown on your submittal or standard coarse-threaded bolts secured with epoxy.

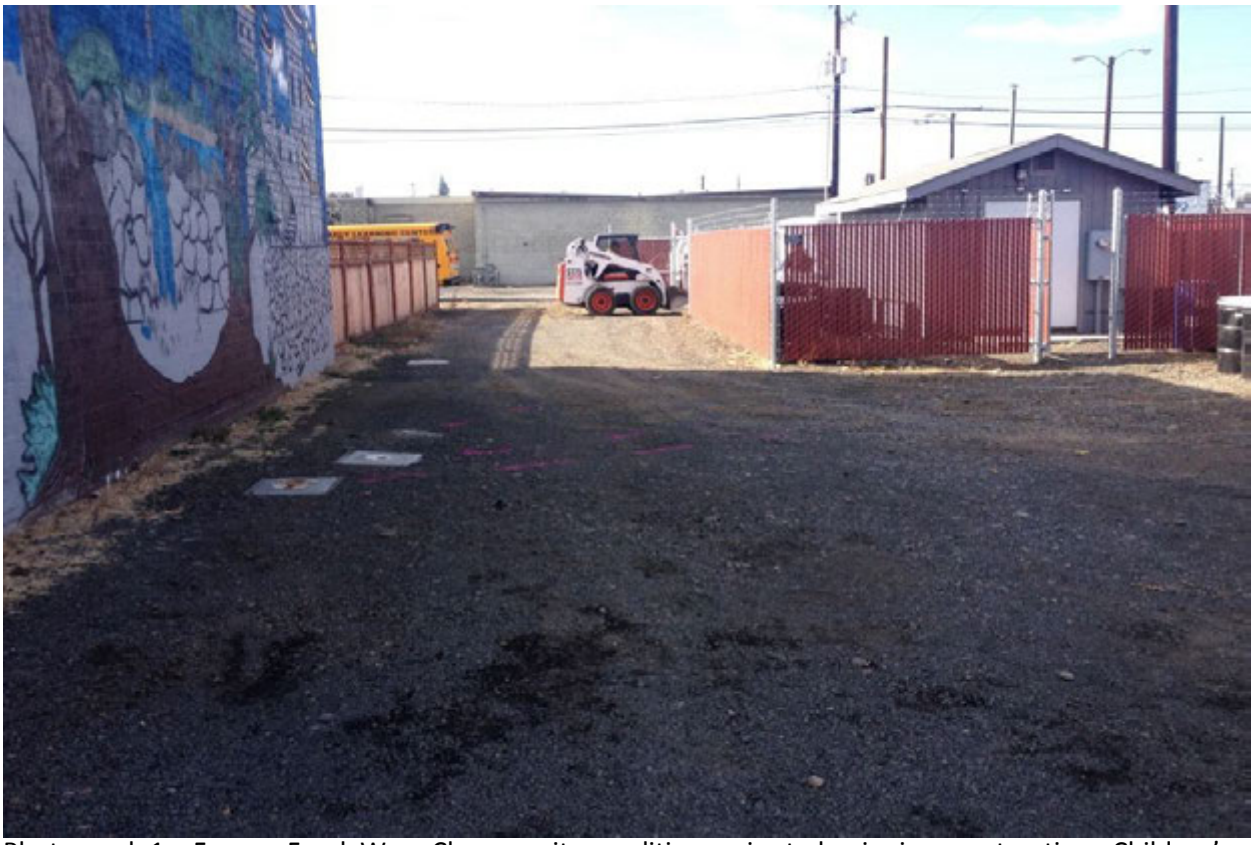
I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as other wise stated.

Section II – APPROVAL ACTION

ENCLOSURES RETURNED (List by Item No.)	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE
	Jill Kiernan, PE, Associate Engineer Hart Crowser, Inc.	December 5, 2013

REVIEWED
BY Jill Kiernan
DATE 12/5/2013

APPENDIX C
Selected Construction Photographs



Photograph 1 – Former Frank Wear Cleaners site conditions prior to beginning construction. Children's daycare building on the left, SVE system on the right. Photograph taken facing west.

Photograph 2 – South 3rd Avenue sidewalk conditions prior to construction. Children's daycare water service line marked in blue in foreground. Photograph taken facing north.

Photograph 3 – Landscaped area on the north side of CWCMH facility property prior to construction. Children's daycare building to the right. Photograph taken facing west.

Photograph 4 – SVE System enclosure opened up during site preparation activities. GTS to be installed to west of SVE system and existing fence extended. Photograph taken facing northeast.

Photograph 5 – Alleyway along the west side of the Site showing multiple underground utilities including from left to right; natural gas, sewer, irrigation, and communication lines. Photograph taken facing south.

Photograph 6 – GTS prior to delivery. Photograph shows the external construction of the building including I-beam skid foundation.

Photograph 7 – Inside of the GTS, photograph shows the injection well manifold on the left and a portion of the extraction well manifold on the right.

Photograph 8 – GTS concrete foundation form work and reinforced rebar grid. Rebar is spaced 12 inches apart.

Photograph 9 – ERRG staff working concrete mixture and positioning rebar grid while pouring concrete foundation. Treatment compound fence shown in the background. Photograph taken facing east.

Photograph 10 – Concrete slab poured. Private asphalt parking lot shown in the background with SVE system fence to the right. Photograph taken facing northeast.

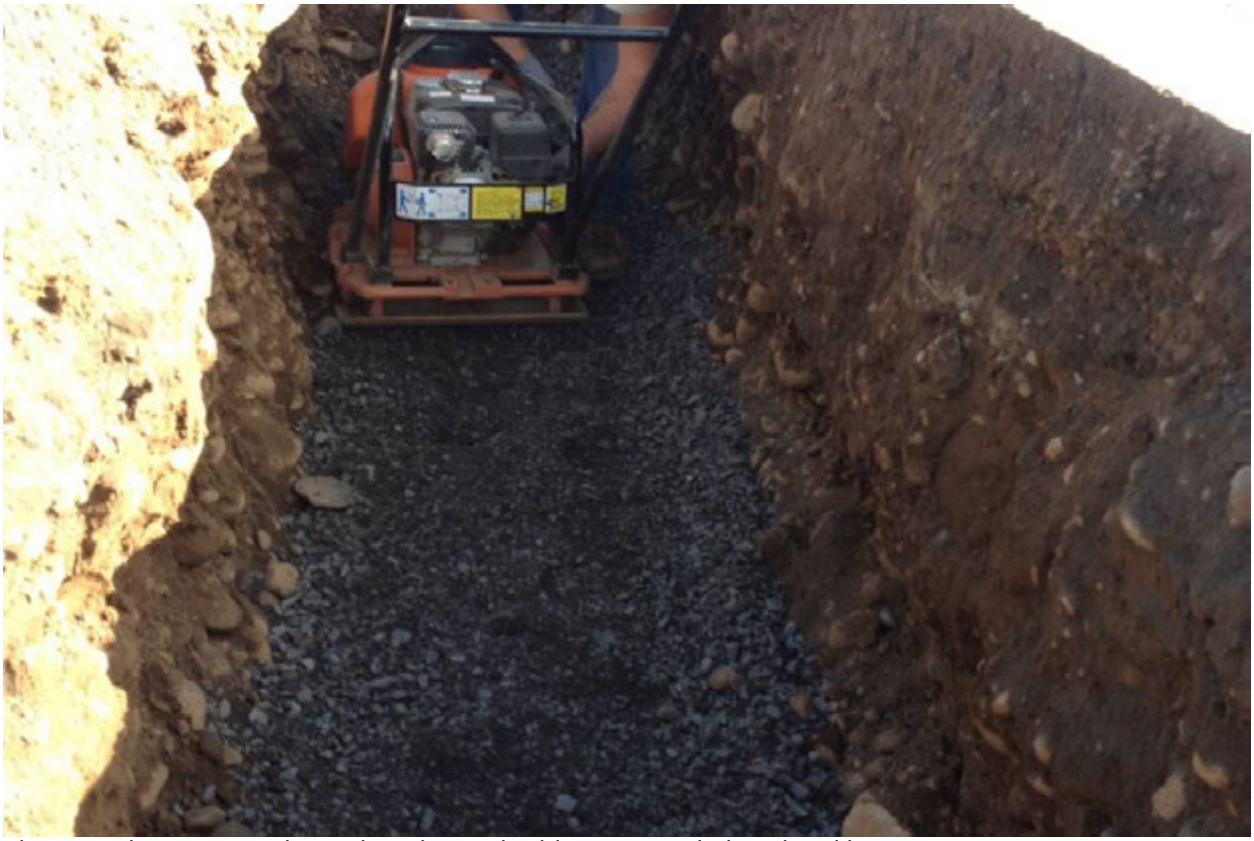
Photograph 11 – Installation of the GTS building on the concrete slab. Note four groundwater extraction pipes surfacing near the center of the building, four groundwater injection pipes surfacing near the right of the building, and an electrical pull box shown in the foreground. Photograph taken facing northeast.

Photograph 12 – External switches installed on the GTS building to control batch tank mixer and heater.

Photograph 13 – Concrete cutting on the private parking lot north of the Site. Injection well INJ-2 can be seen behind the employee. Photograph taken facing southwest.


Photograph 14 – Trenching to INJ-1 (well casing visible) showing typical cave-in issues encountered within trenches. In this photograph the pipe bedding material was loosely placed when cave-in occurred. Photograph taken from within INJ-1 trench facing west.

Photograph 15 – Typical well casing (white) with conveyance pipe (gray).



Photograph 16 – Typical trench with pipe bedding material placed and beginning compaction.

Photograph 17 – INJ-1 trench with conveyance pipe installed over compacted bedding material with tracer wire attached. Photograph taken facing west.

Photograph 18 – Typical spacing of multiple conveyance pipes sharing a trench.

Photograph 19 – This photograph shows a second row of conveyance pipes placed over a lower row of installed pipe. Contractor is installing fittings on lower row in photograph. Purple coils of utility tracer wire can also be seen.

Photograph 20 – Photograph shows intersection of conveyance pipe and electrical conduit (employee is holding) at EXT-4 (white vertical pipe with orange cap). Four lower pipes on the right are capped in the photograph for future installation. Two pipes on the left are conveyance pipe for EXT- and EXT-3. South 3rd Ave. is on the right.

Photograph 21 – Photograph shows GTS building foundation slab with excavation on all sides for pipe installation. Extraction well pipes are in the foreground on the left. Extraction well conduit crosses over the conveyance pipe and wraps around the slab. Injection well pipe wraps around the slab on the right with electrical conduit for batch tank accessories currently sitting on the pipe. The abandoned dry well is visible in the foreground. Photograph taken facing northeast.

Photograph 22 – Wetting trench backfill while placing along S 3rd Ave. Photograph taken facing north.

Photograph 23 – Extraction well trench surface completed using hot asphalt. S 3rd Ave is on the left, the Site and children's daycare are on the right. Photograph taken facing south.

Photograph 24 – Extraction well EXT-2 and EXT-3 trench surface material within landscaped area of CWCMH facility property. Photograph taken facing east.

Photograph 25 – Hydrostatic pressure tester sitting on GTS foundation slab connected to injection well piping. Photograph taken facing north-northeast.


Photograph 26 – Typical injection well vault showing wellhead connections.

Photograph 27 – Typical electrical boxes installed in extraction well vaults. Manual pump on/off switch provided on the left with electrical connection/pull box on the right.


Photograph 28 – Typical extraction well vault showing wellhead connections and electrical components.

Photograph 29 – Typical electrical pull box vault.

Photograph 30 – Photograph shows decommissioning of drywell on the Site by filling with leftover concrete after pouring GTS building foundation slab.

Photograph 31 – Excavated soil pile on the Site pending analysis for disposal. Photograph taken facing northwest.

Photograph 32 – Truck bed liner being lined with plastic for impacted soil disposal. Photograph taken facing south.

APPENDIX D
Well Construction Logs

Key to Exploration Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits and probes is estimated based on visual observation and is presented parenthetically on the logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot
Very loose	0 to 4	Very soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Medium dense	10 to 30	Medium stiff	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very dense	>50	Very stiff	15 to 30
		Hard	>30

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, likely below optimum
Moist	Likely near optimum moisture content
Wet	Much perceptible moisture, likely above optimum

Minor Constituents	Estimated Percentage
Trace	<5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Sampling Test Symbols

Split Spoon | Cuttings | Core Run

Push Probe | Grab (Jar)

Test Symbols

NA	Not Available
NS	No Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
PID	Photoionization Detector Reading

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

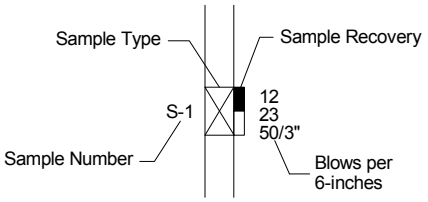
NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Groundwater Indicators

Groundwater Level on Date or (ATD) At Time of Drilling

Groundwater Seepage (Test Pits)

Sample Key



HARTCROWSER

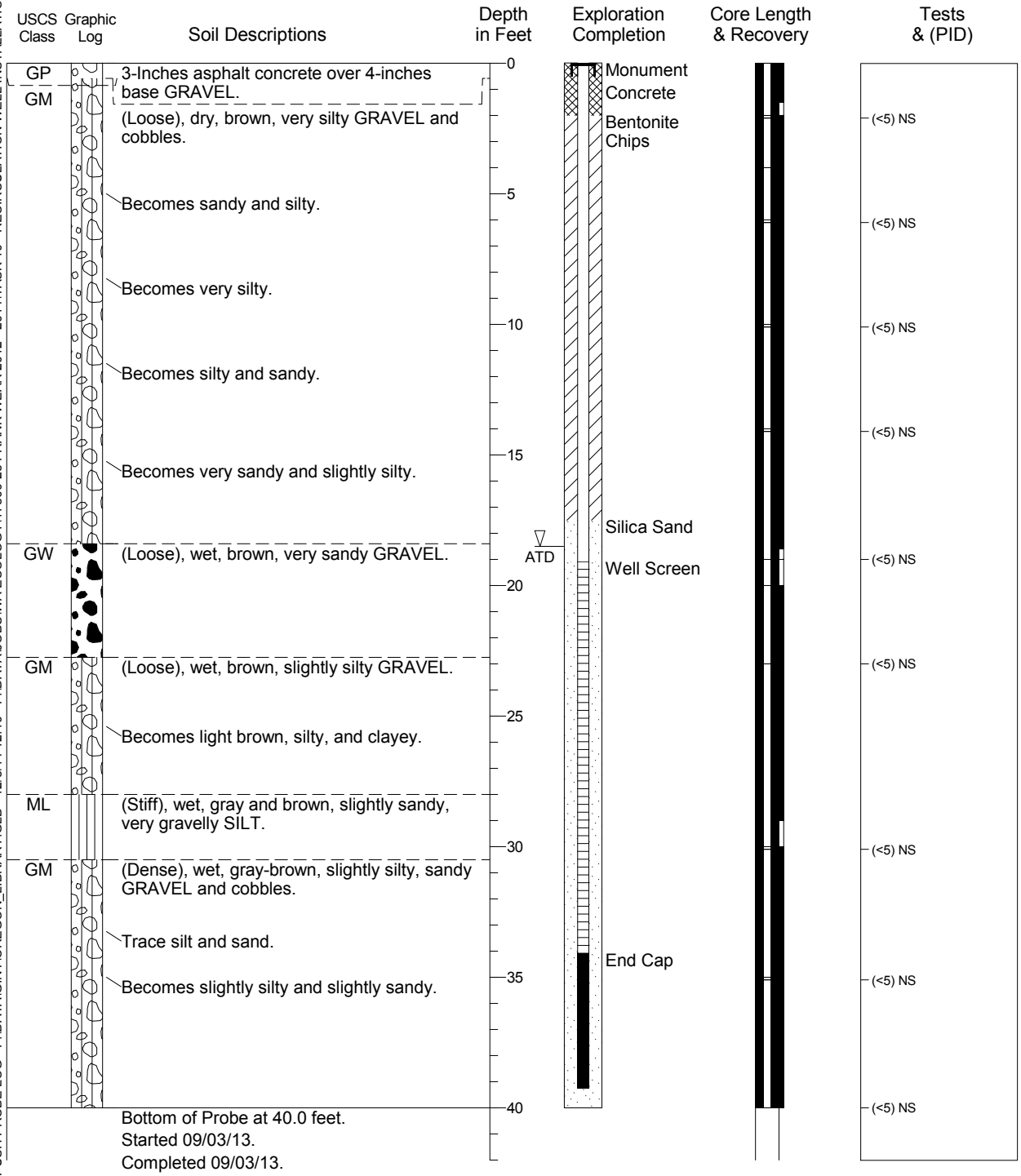
17800-23 12/14

Figure D-1

Injection Well Construction Data for INJ-1

Location: Yakima, Washington
Logged By: Jason Miles
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

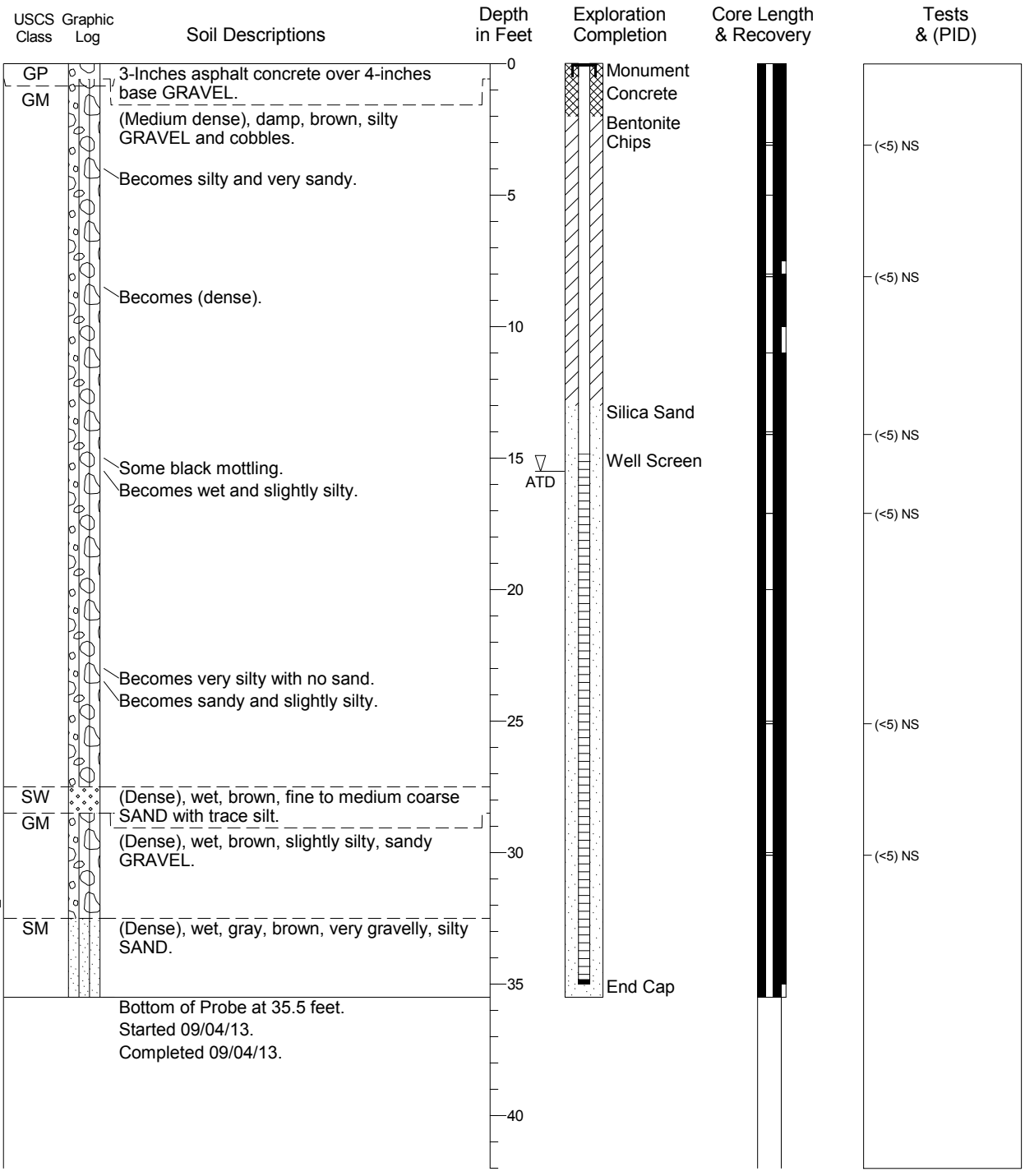
17800-23 *12/14*

Figure D-2

Injection Well Construction Data for INJ-2

Location: Yakima, Washington
Logged By: Jason Miles
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

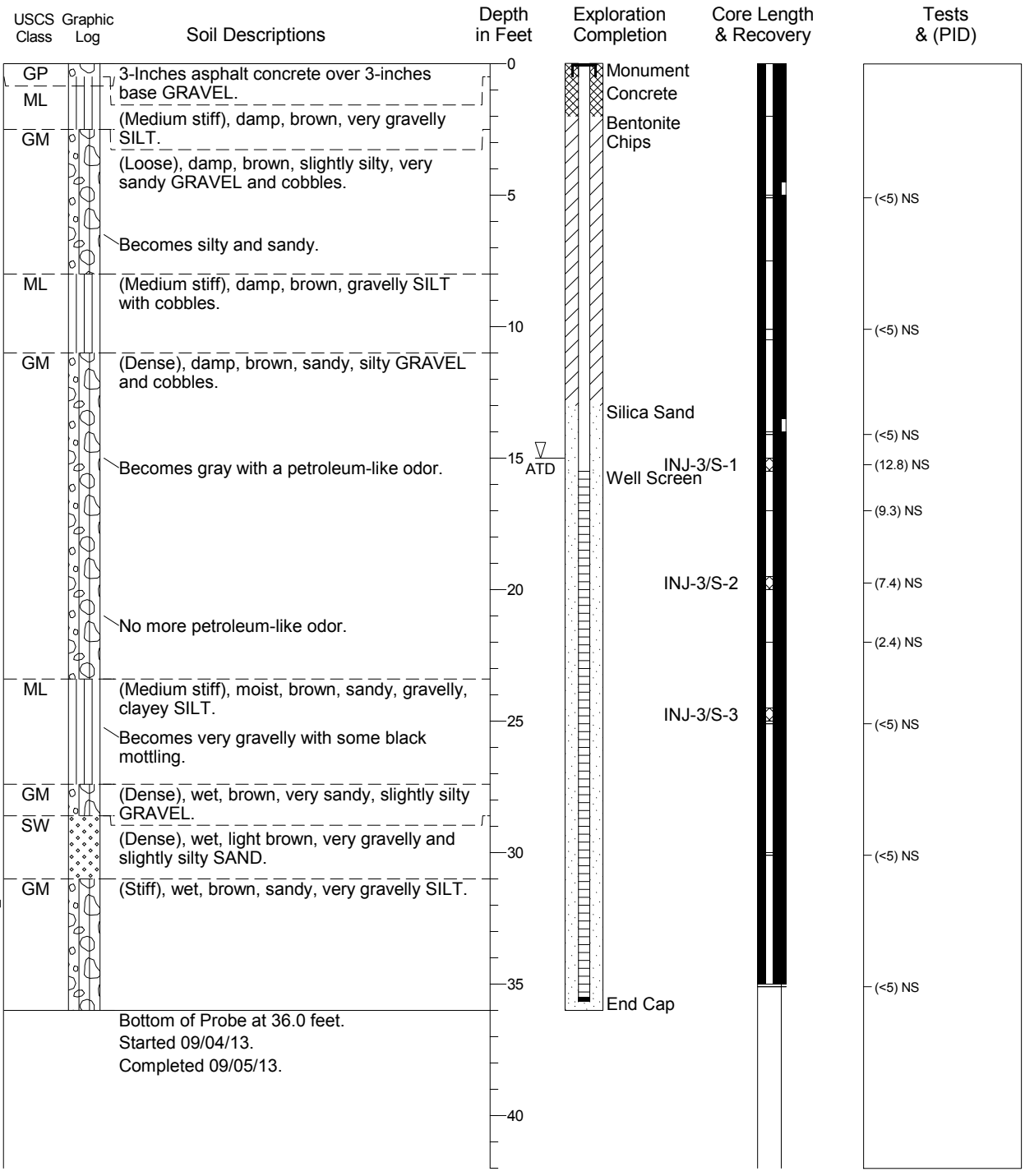
17800-23 *12/14*

Figure D-3

Injection Well Construction Data for INJ-3

Location: Yakima, Washington
Logged By: Jason Miles
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

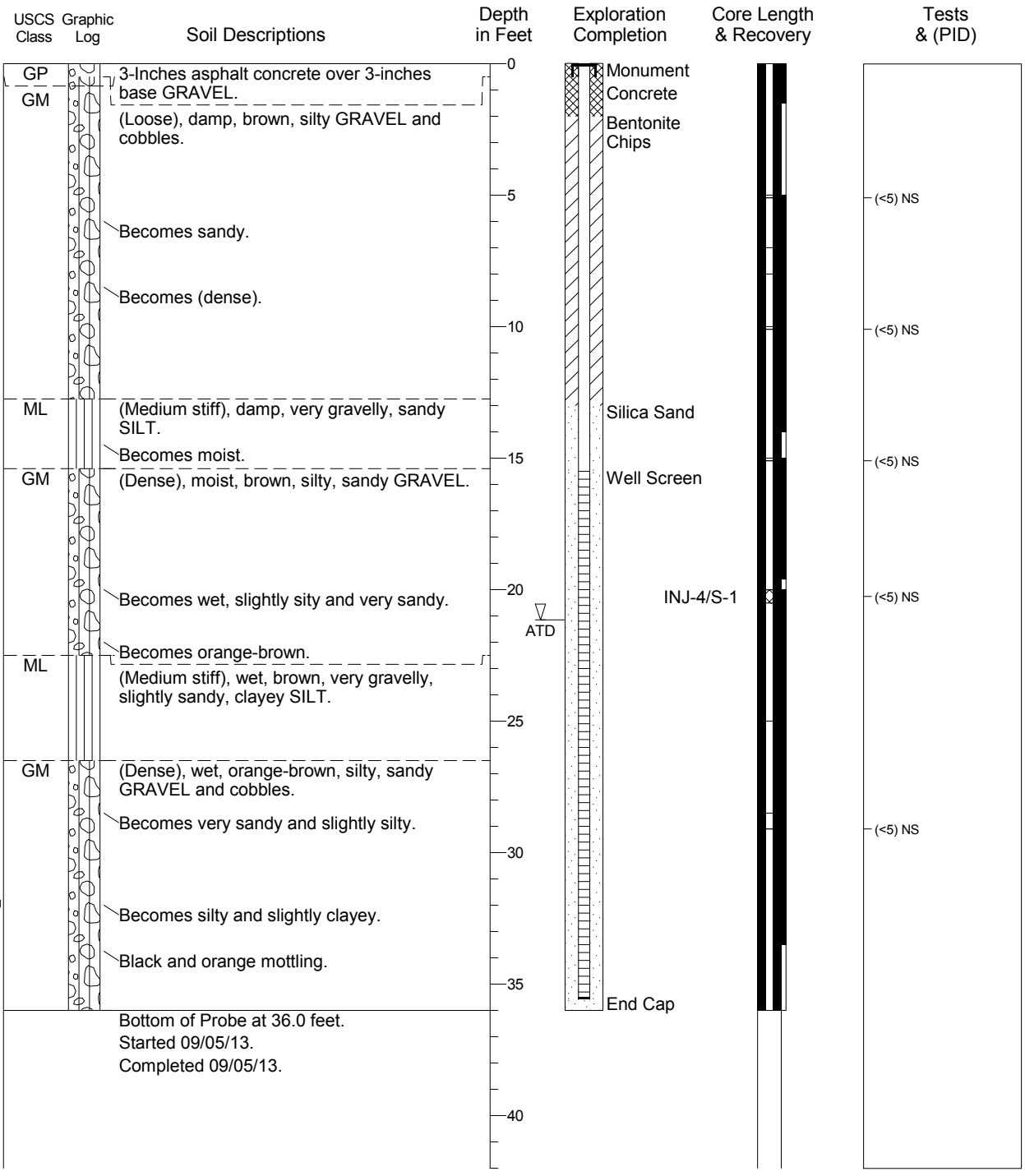
17800-23 *12/14*

Figure D-4

Injection Well Construction Data for INJ-4

Location: Yakima, Washington
Logged By: Jason Miles
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

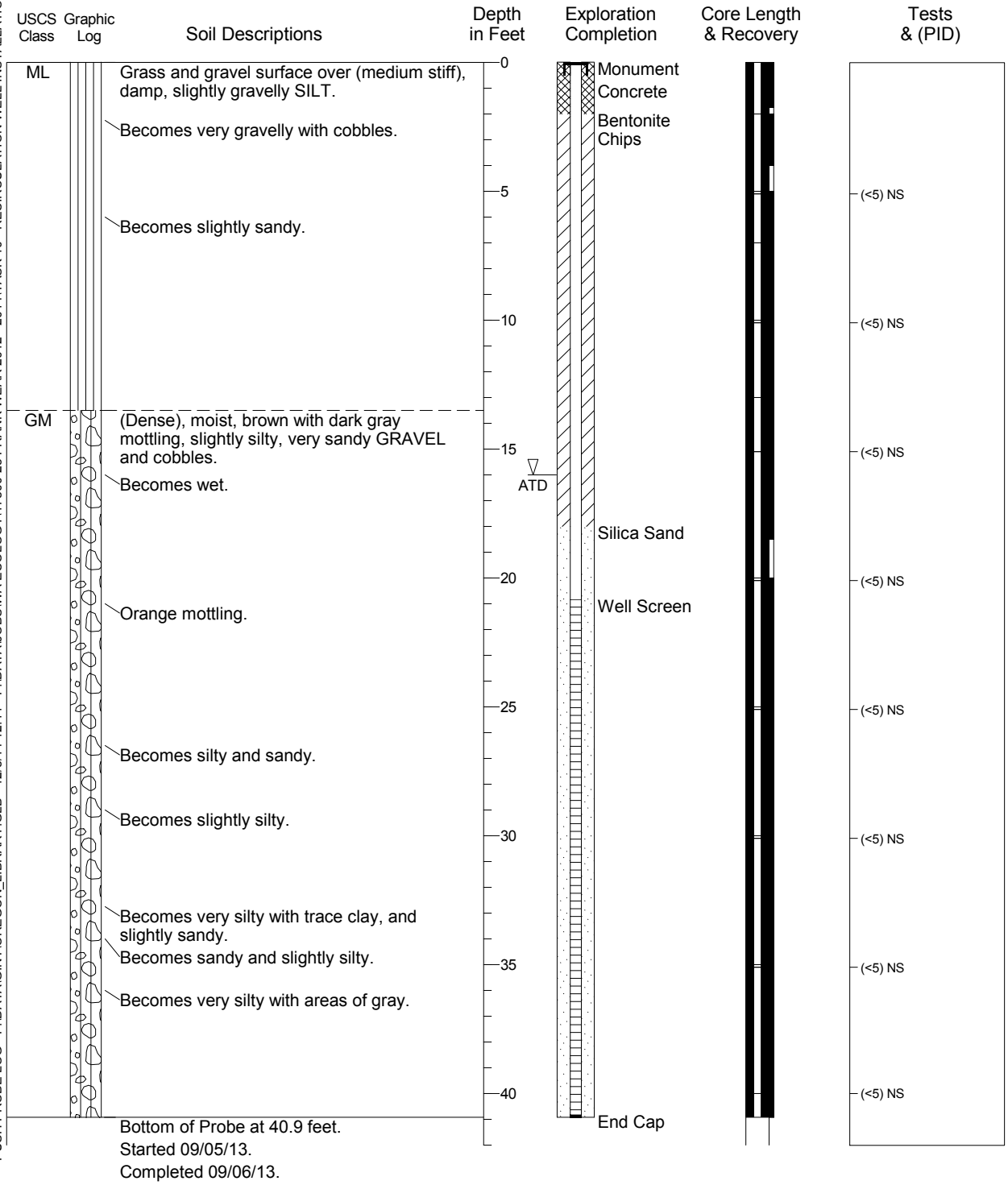
17800-23 *12/14*

Figure D-5

Extraction Well Construction Data for EXT-1

Location: Yakima, Washington
Logged By: Jason Miles
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

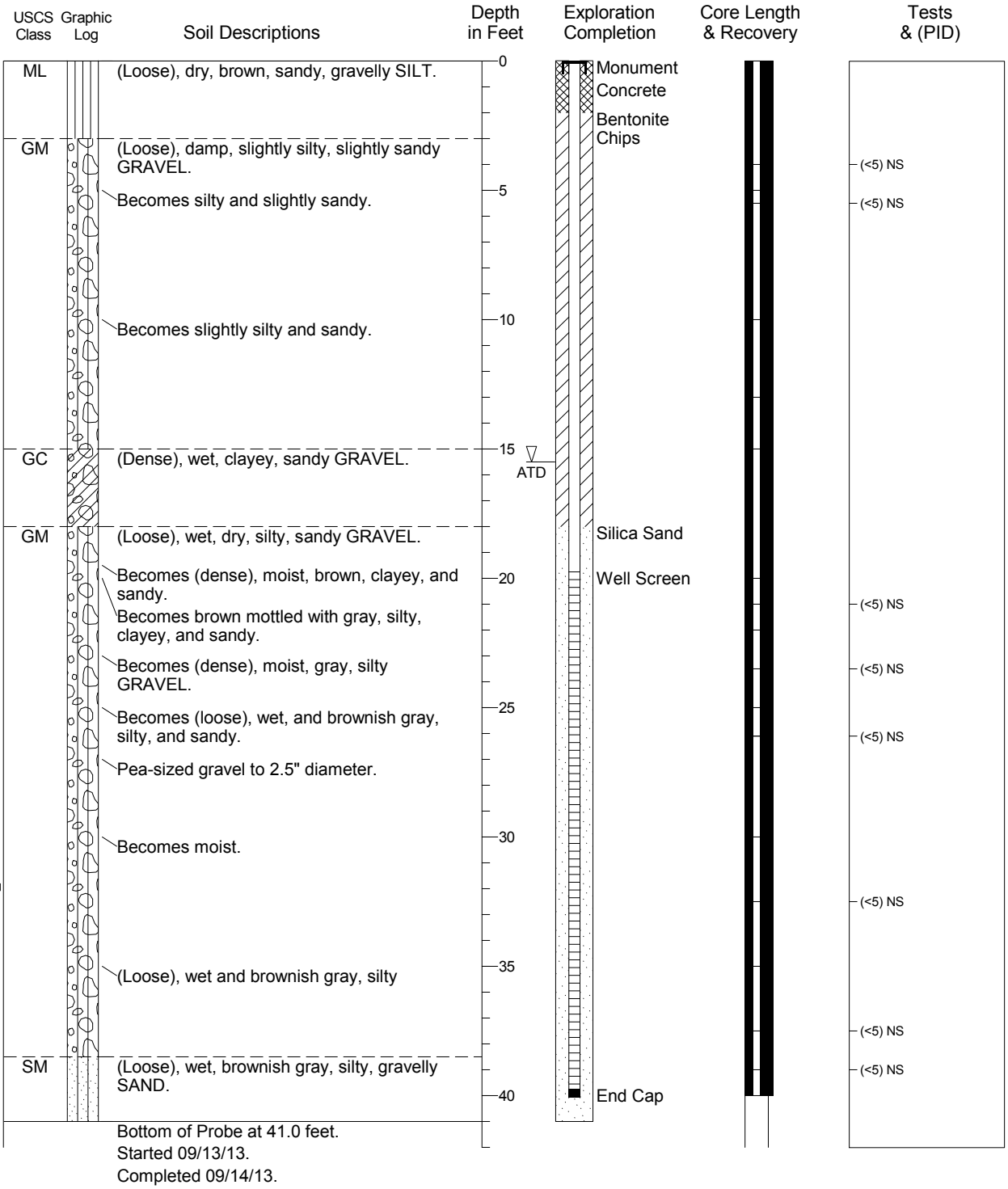
17800-23 *12/14*

Figure D-6

Extraction Well Construction Data for EXT-2

Location: Yakima, Washington
Logged By: Chris Martin
Reviewed By: Jill Kiernan, PE

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

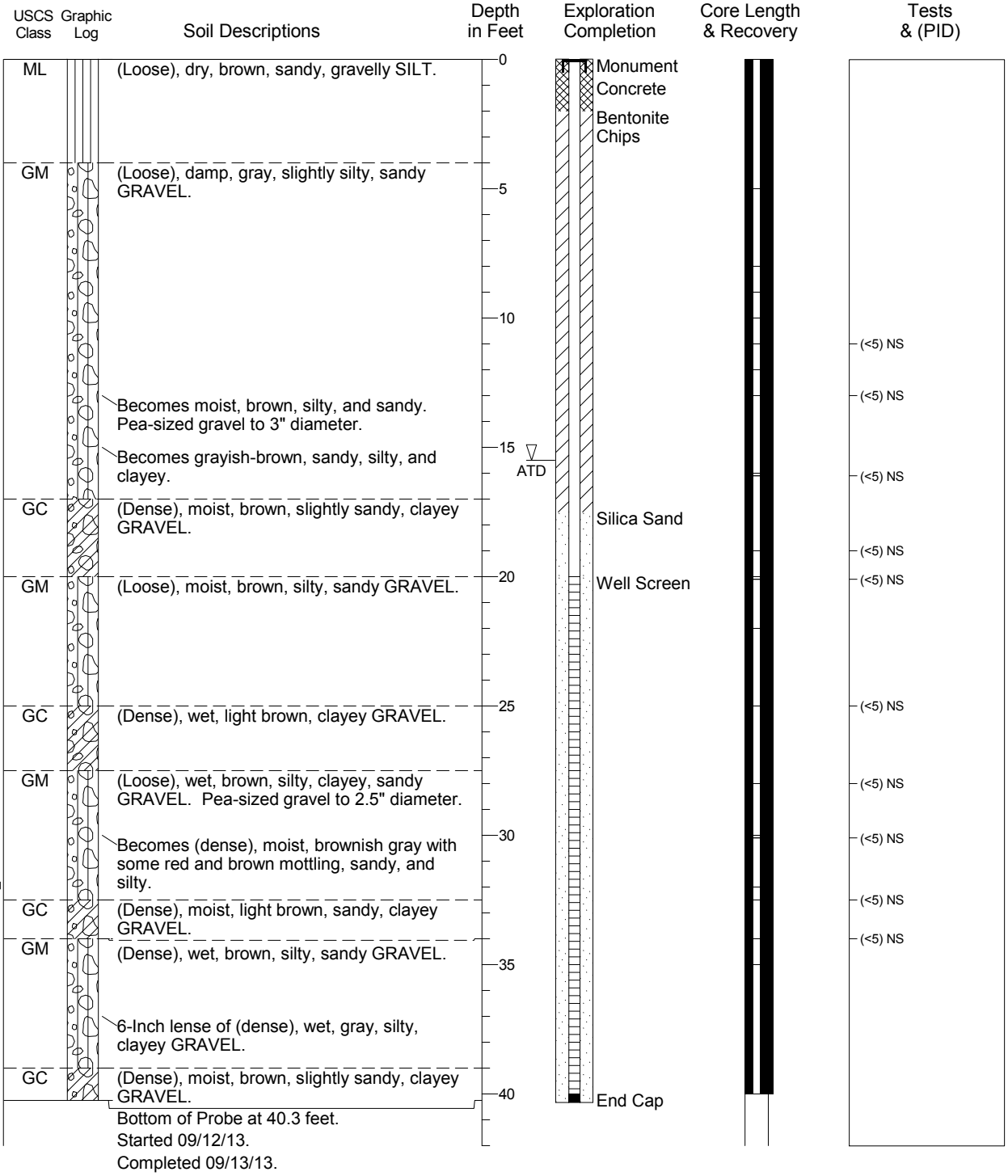
17800-23 12/14

Figure D-7

Extraction Well Construction Data for EXT-3

Location: Yakima, Washington
Logged By: Chris Martin
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

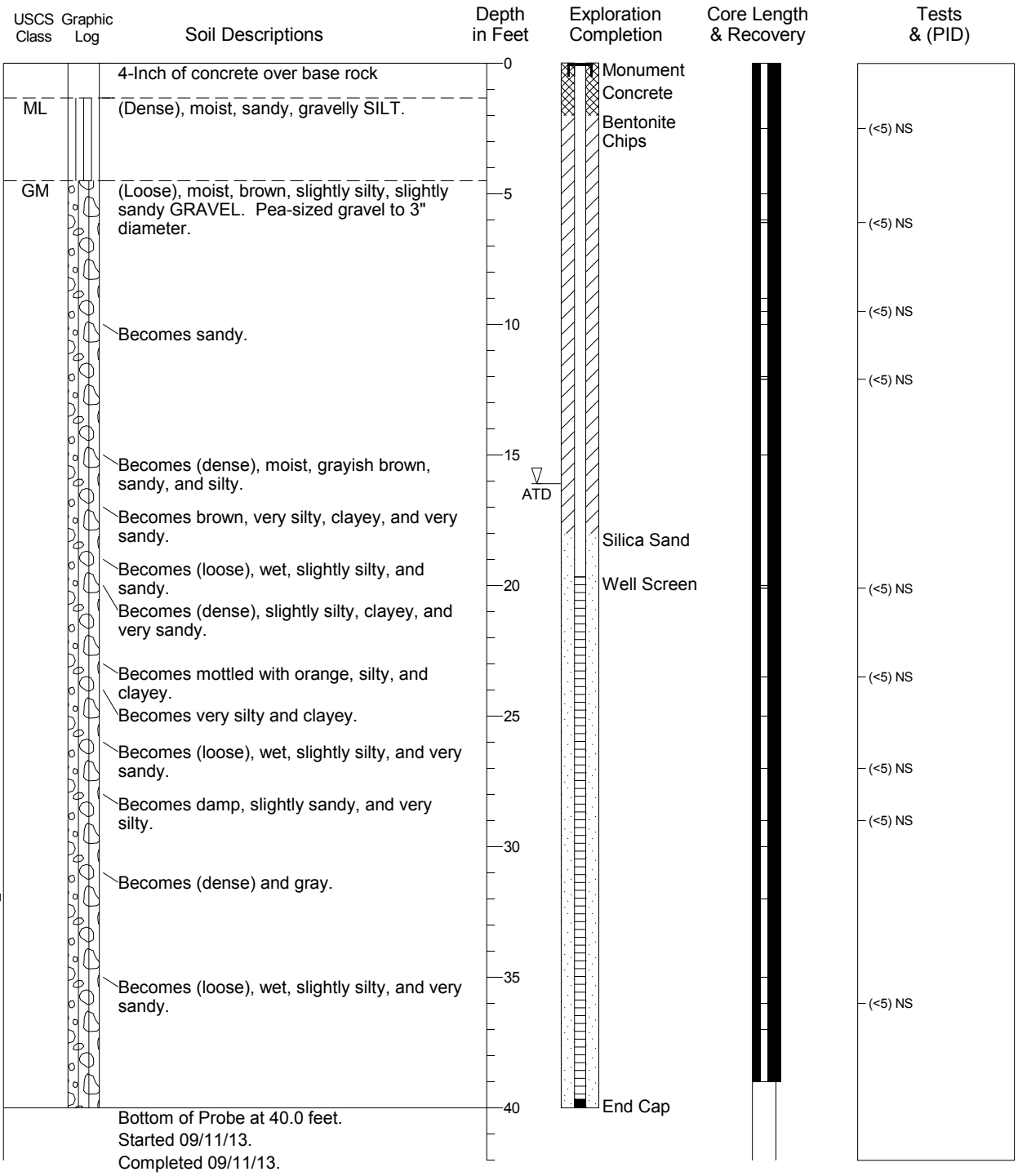
17800-23 *12/14*

Figure D-8

Extraction Well Construction Data for EXT-4

Location: Yakima, Washington
Logged By: Chris Martin
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

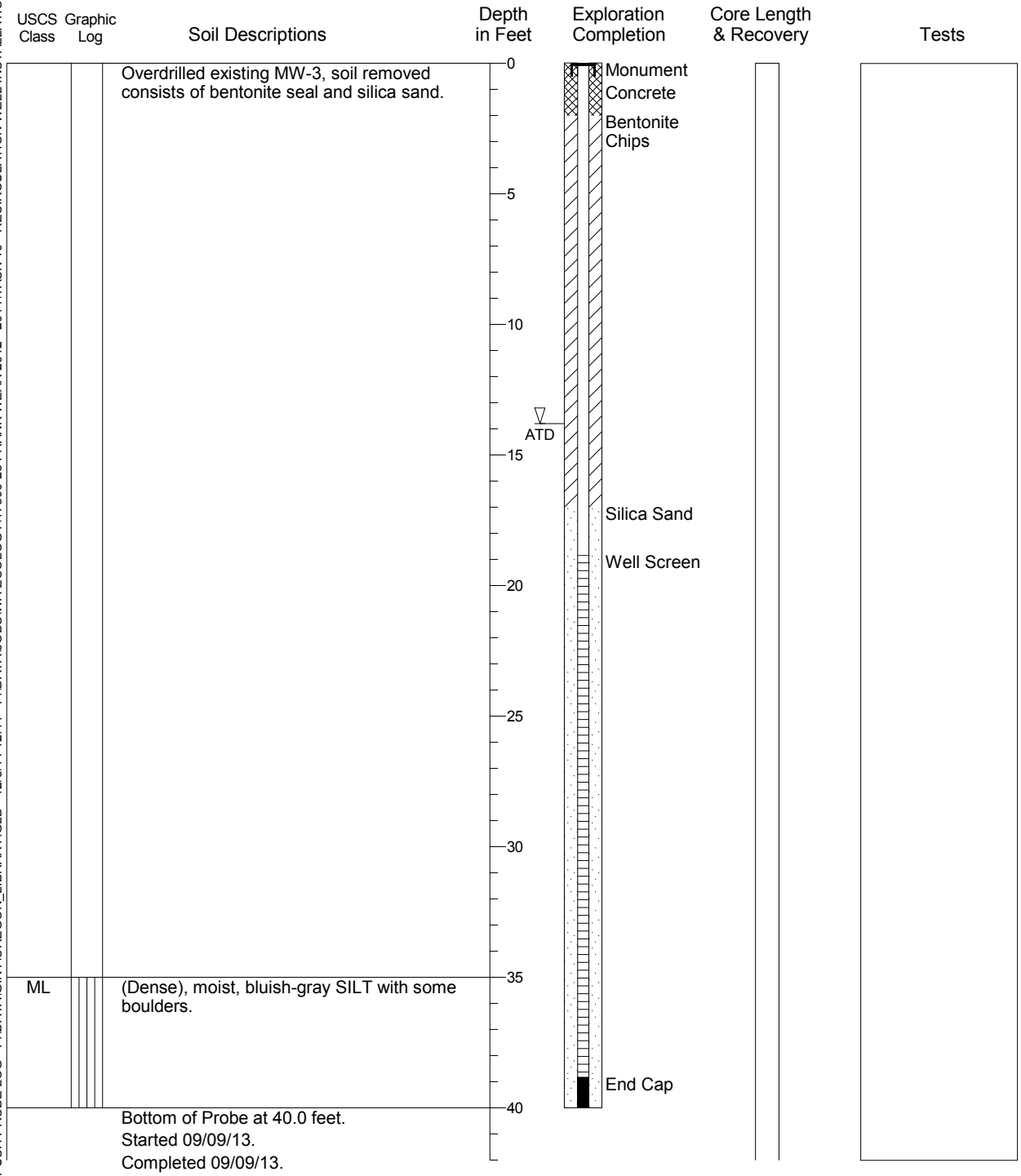
17800-23 *12/14*

Figure D-9

Extraction Well Construction Data for EXT-5

Location: Yakima, Washington
Logged By: Chris Martin
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
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3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

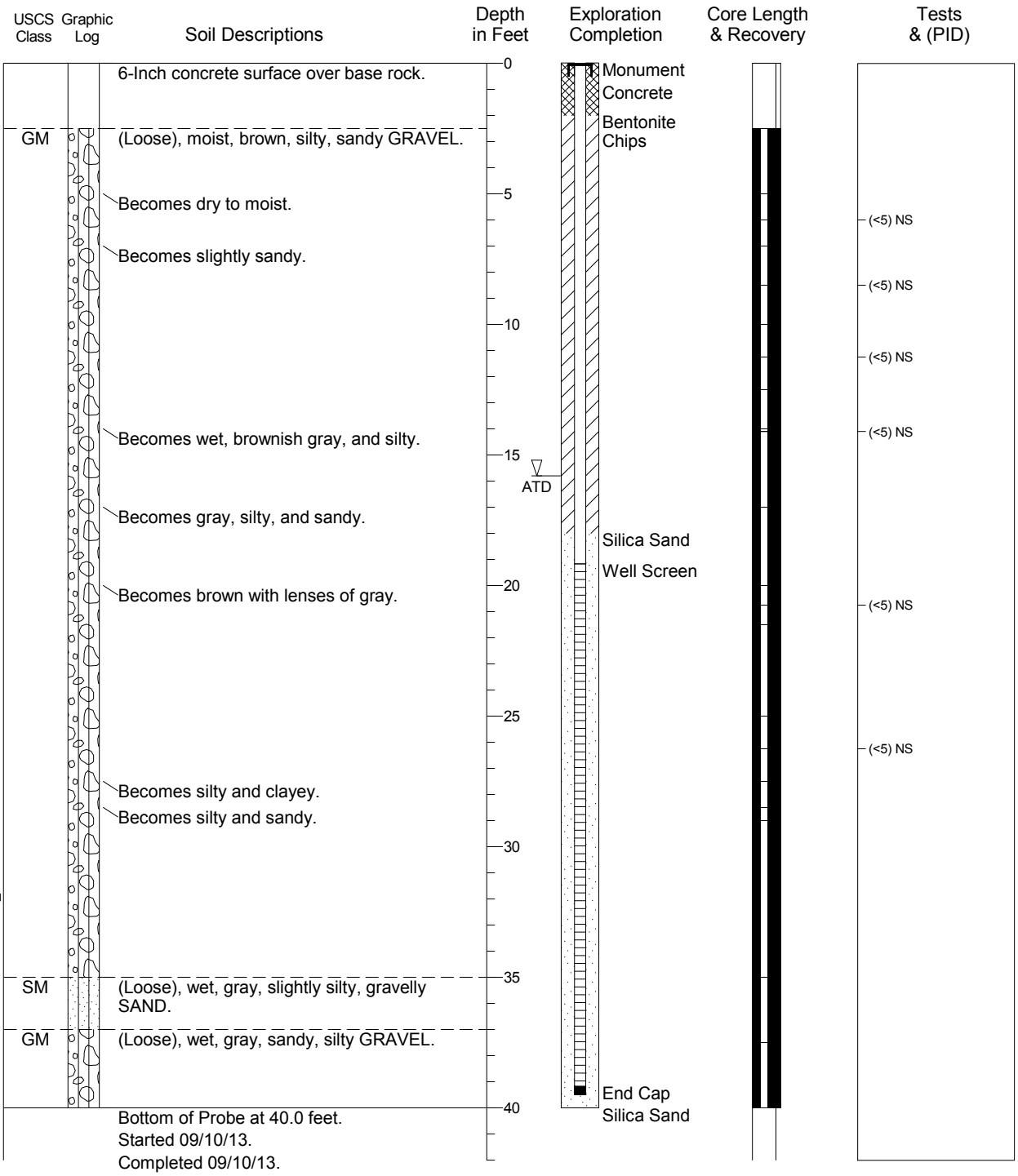
17800-23 *12/14*

Figure D-10

Extraction Well Construction Data for EXT-6

Location: Yakima, Washington
Logged By: Chris Martin
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
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4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

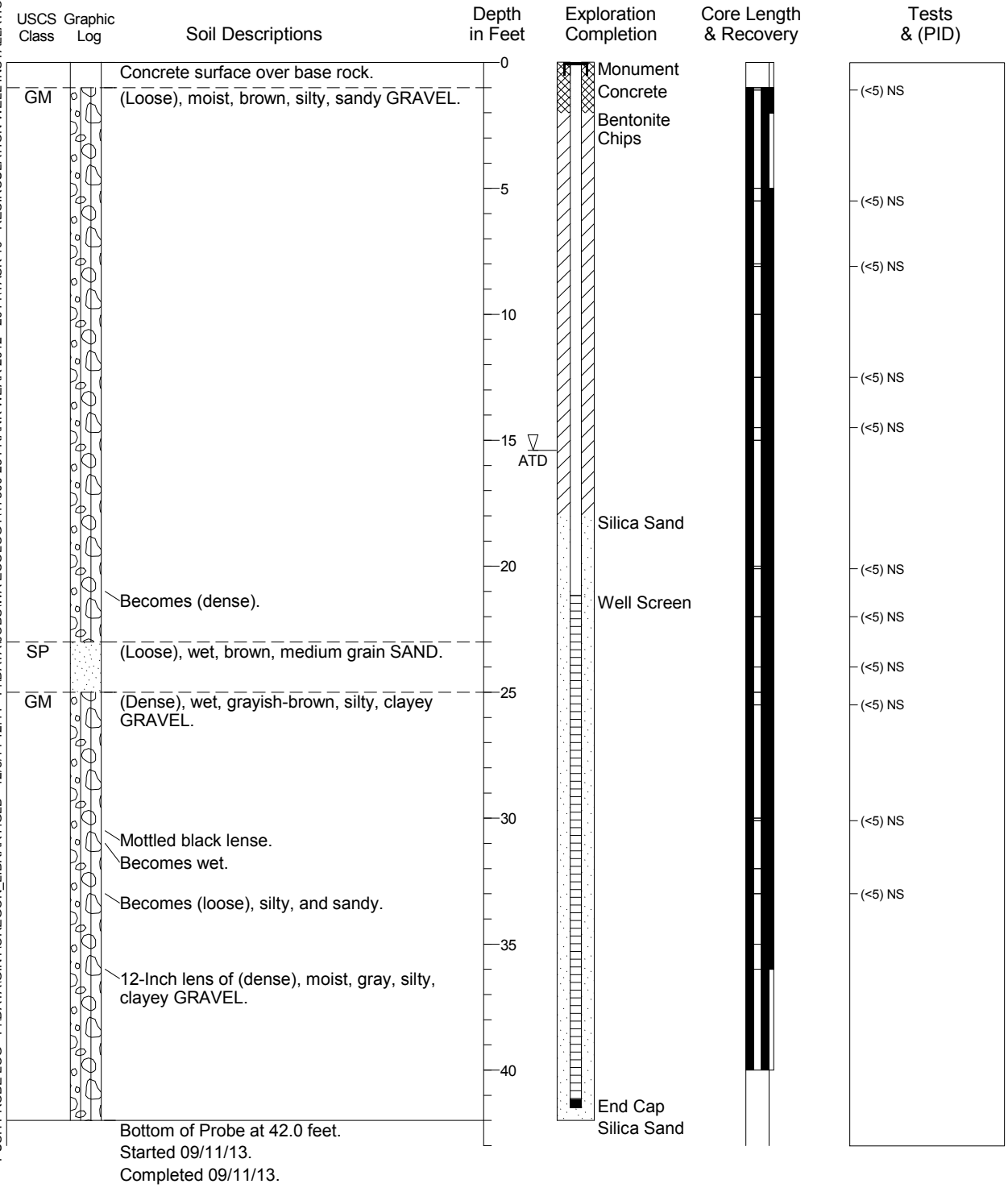
17800-23 *12/14*

Figure D-11

Extraction Well Construction Data for EXT-7

Location: Yakima, Washington
Logged By: Chris Martin
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

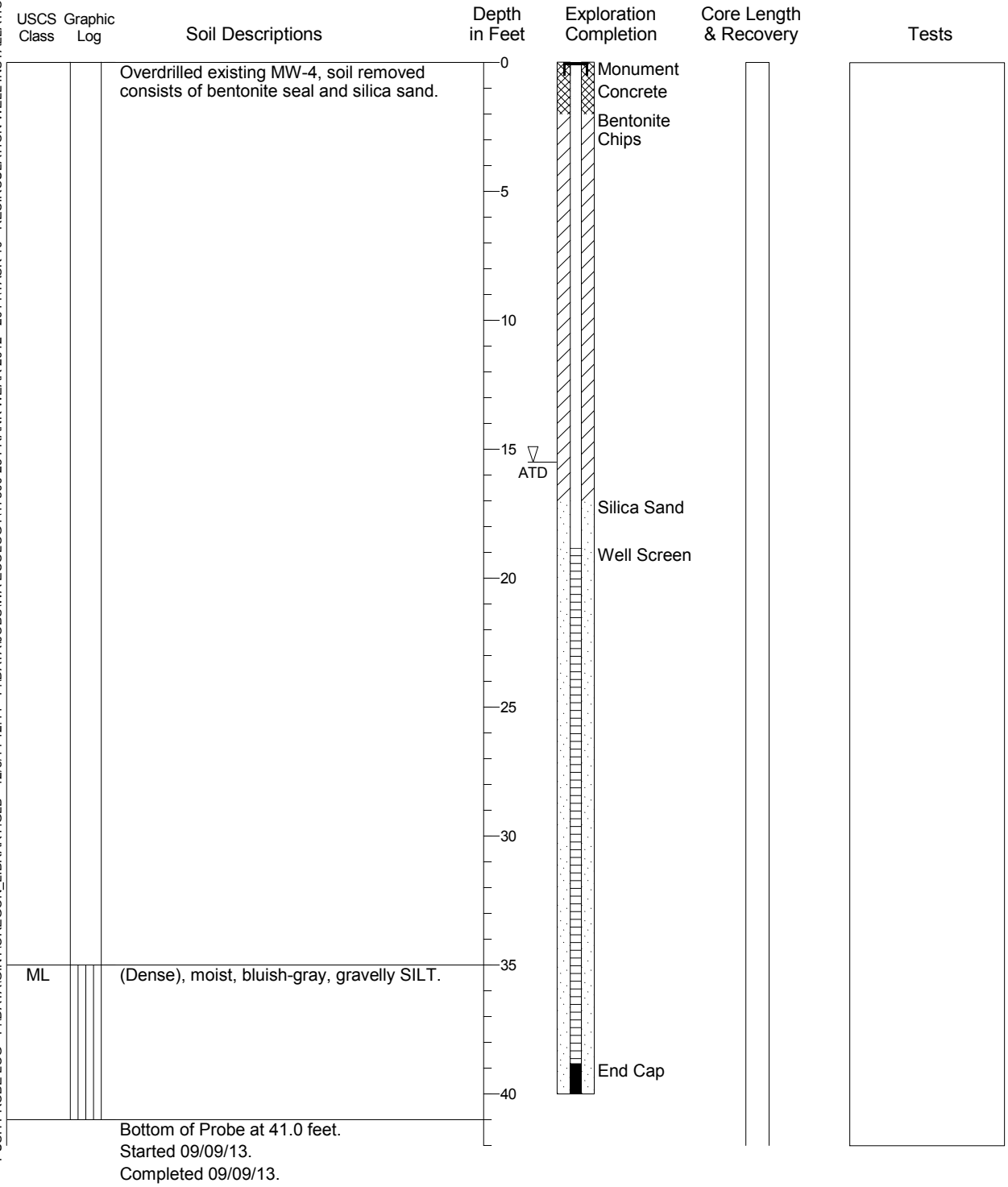
17800-23 *12/14*

Figure D-12

Extraction Well Construction Data for EXT-8

Location: Yakima, Washington
Logged By: Chris Martin
Reviewed By: Leon Lahiere, LG

Drill Equipment: Sonic
Soil Sampler: Core
Hole Diameter: 8 inches



1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Groundwater level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.
5. Drilled By: Cascade Drilling

HARTCROWSER

17800-23 *12/14*

Figure D-13

APPENDIX E
Change Orders

ERRG

Engineering/Remediation
Resources Group, Inc.
616 1st Avenue Suite 300
Seattle, WA 98104

P: 206.282.4749
F: 206.282.4789
www.errg.com

October 25, 2013

Ref.: 2013-086

Mr. Jason Shira
c/o State of Washington, Department of Ecology
Central Regional Office
15 W. Yakima Ave, Suite 200
Yakima, WA 98902-3452

Request for Change Order Proposal 01 for Former Frank Wear Cleaners Groundwater Remediation System

Dear Mr. Shira,

Engineering/Remediation Resources Group, Inc. (ERRG) has received the responses to RFI-001 and RFI-004, which revise the Scope of Work for the extraction and injection wells. Specifically, the changes are:

1. Revise the 2-inch Fernco fittings at the wellheads. (RFI-001)

2. Increase the riser pipe diameter from 1-inch to 1.25-inches for all of the extraction wells. (RFI-004)

3. Add a stainless steel lifting cable between the well seals and the extraction pumps for all of the extraction wells. (RFI-004)

During a follow-up phone conversation with Jill Kiernan, of Hart Crowser, additional details were discussed, which are noted below:

1. Increasing the vault wellhead assemblies from 1-inch to 1.25-inches (for the extraction wells only).

2. Remove the well seals from the scope of work because Hart Crowser will provide (for the extraction wells only).

The following is our proposed Change Order in accordance with the work detailed above and the Changes section of the contract General Conditions. The material costs include the deduction of the 1-inch materials, as well as the well seals.

a.	Lump sum labor	$193.41
b.	Lump sum material	$1,455.52
c.	Lump sum equipment usage	$0.00
d.	Overhead and profit	$372.26
e.	Insurance and bond	$37.90
	Total	**$2,059.09**

ERRG

If you have any questions, please do not hesitate to contact me at (206) 282-4749.

Sincerely,

Matt Hooper
Project Manager

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
15 W Yakima Ave, Ste 200 • Yakima, WA 98902-3452 • (509) 575-2490

November 1, 2013

Mr. Randy Randall
Engineering/Remediation Resources Group, Inc.
616 First Avenue, Suite 300
Seattle, WA 98104

Subject: Change Order Proposal 01 – Well Head Modifications
Contract No.: C1400084
Facility/Site Name: Former Frank Wear Cleaners Site – Groundwater Remediation
F/S Id: 444
Cleanup Site ID: 4194

Dear Mr. Randall:

This is Ecology's determination/authorization letter to approve of the ERRG-requested compensation to cover the cost of revising the fittings at the wellheads, increasing the riser pipe diameter, adding a stainless steel lifting cable for pumps, increasing the vault wellhead assemblies, and removing wells seals from scope of work. This added compensation is an extension of the original scope of work (the Total Base Bid Schedule: Item 2 – Construction of Well Head Assemblies and Well Piping) as specified in the Project Manual.

The amount of compensation due to the change of lump sum for well head assemblies shall be $2,059.09 plus state sales tax and includes all costs for materials, labor, equipment, overhead and profit. No extension of contract time is authorized for this work. This letter will be used to develop the Change Order after the work is completed.

The Project Manual specified flexible couplings. Upon review (RFI-001) it was determined that a rigid mechanical or glue-on fitting is more appropriate to reduce potential for leakage. Upon review of the extraction pump specifications a change in riser pipe diameter and addition of lifting cable were appropriate for the extraction wells only (RFI-004). These changes result in a net increase in material cost after deduction of previously scoped 1-inch diameter pipe and wells seals.

The basis of cost increase calculation is:

Well Head Assembly – Lump Sum	Costs
Lump Sum Labor	$ 193.41
Lump Sum Material	$1,455.52
Lump Sum Equipment Usage	$ 0.00
Overhead and Profit	$ 372.26
Insurance and Bond	$ 37.90
Total	$2,059.09

Once all work is complete, we will prepare a change order to incorporate the amount of its additional cost ($2,059.09 + Local Sales Tax) into the contract. All terms and conditions of the contract remain in effect. Should you have any questions, do not hesitate to call Jason Shira.

Sincerely,

Valerie Bound

Valerie Bound
Central Regional Office Section Manager
Toxics Cleanup Program

CC: Jason Shira, Site Manager
Joe Ward, TCP Contracts Officer
Jill Kiernan, Hart Crowser

ERRG
Engineering/Remediation Resources Group, Inc.
616 1st Avenue Suite 300
Seattle, WA 98104
P: 206.282.4749
F: 206.282.4789
www.errg.com

November 8, 2013

Ref.: 2013-086

Mr. Jason Shira
c/o State of Washington, Department of Ecology
Central Regional Office
15 W. Yakima Ave, Suite 200
Yakima, WA 98902-3452

Request for Change Order Proposal 02 for Former Frank Wear Cleaners Groundwater Remediation System

Dear Mr. Shira,

We have encountered some changes regarding installation of the electrical supply for the Groundwater Extraction System for the Former Frank Wear Cleaners project. These changes were identified and have been discussed at the site and over the phone beginning on November 5, 2013. Those changes to the electrical supply that were not included in the original bid documents are identified in the following three bullets:

- The electrical inspector would not allow our subcontractor to use the existing 4-inch Schedule 40 PVC spare conduit on the north side of the existing SVE System. This required ERRG to excavate, install a new 2-inch Schedule 80 conduit, and backfill the excavation.

- A transformer is required to convert power from 480 to 240 volts. The transformer requires a concrete pad for it to be mounted (estimated dimensions are 2-foot by 3-foot by 4 inches thick). We have included the costs for preparing the subgrade beneath the pad framing, pouring concrete and finishing the slab.

- The addition of the new pad and transformer will require the final fence to be extended and adjusted to accommodate the new items. Additional fence was also required in order to obtain the 10-foot separation between the new groundwater remediation system pad and existing SVE system pad. This will require the west side of the security fence to be extended an additional 12 feet from the design extension of 6 feet, for a total extension of 18 feet.

- We are requesting an additional 3.5 days of effort and subcontractor supervision for the work described above. No additional contract time is requested. The additional effort is based on completing the installation of the new conduit, concrete pad, transformer and connecting the remediation system by Friday, November 15, 2013.

- The estimated lead time for the transformer is 1-2 business days. The costs do not include rush shipping.

The following is our estimated costs associated with this proposed Change Order in accordance with the work detailed above and per Division 00, Section 00 72 00, Part 7.

ERRG

a.	Lump sum labor (including travel)	$9,045.03
b.	Lump sum material	$612.50
c.	Lump sum equipment usage	$2,954.83
d.	Lump sum subcontractor costs	$7,890.00
e.	Overhead and profit	$7,497.97
f.	Insurance and bond	$525.00
	Total	**$28,525.33**

If you have any questions, please do not hesitate to contact me at (206) 282-4749.

Sincerely,

Matt Hooper
Project Manager

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
15 W Yakima Ave, Ste 200 • Yakima, WA 98902-3452 • (509) 575-2490

November 27, 2013

Mr. Randy Randall
Engineering/Remediation Resources Group, Inc.
616 First Avenue, Suite 300
Seattle, WA 98104

Re: Authorization Letter 02 – Electrical and Fence Modifications
Contract No. C1400084

Site Name: Frank Wear Cleaners
Site Address: 106 South 3rd Avenue, Yakima
F/S ID No.: 444
Cleanup Site No.: 4194

Dear Mr. Randall:

This is Ecology's determination/authorization letter to approve of the ERRG-requested compensation to cover the cost for installing electrical conduit, transformer and associated concrete pad, plus extending the fence perimeter to accommodate the added transformer. This added compensation is an extension of the original scope of work based on time and materials.

The Project Manual specified connection of the remediation building to the service panel. Upon review of the Treatment System Startup Manual and site inspection of the service panel it was determined a step down transformer was necessary to make the connection (RFI-006). These changes result in a net increase in labor and material costs.

The basis of cost increase calculation is:

Electrical System	Costs
Labor	$ 3,471.16
Material	$ 383.74
Equipment Usage	$ 1,448.26
Travel	$ 766.08
Subcontractor	$ 5,725.00
Overhead and Profit	$ 1,907.72
Security Fence	
Labor	$ 1,754.50
Material	$ 129.80
Equipment Usage	$ 570.21
Travel	$ 86.56
Subcontractor	$ 2,000.00
Overhead and Profit	$ 759.03
Insurance, Bond, and Taxes	$ 356.29
Total	$19,358.35

Once all work is complete and cost is determined, we will prepare a change order to incorporate the amount of its additional cost (not to exceed $19,358.35) into the contract. All terms and conditions of the contract remain in effect. Should you have any questions, do not hesitate to call Jason Shira.

Sincerely,

Valerie Bound
Central Regional Office Section Manager
Toxics Cleanup Program

CC: Jason Shira, Site Manager
Joe Ward, TCP Contracts Officer
Jill Kiernan, Hart Crowser

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
15 W Yakima Ave, Ste 200 • Yakima, WA 98902-3452 • (509) 575-2490

April 22, 2014

Mr. Randy Randall
Engineering/Remediation Resources Group, Inc.
616 First Avenue, Suite 300
Seattle, WA 98104

Re: Authorization Letter 03 – Reduction in Work; Contract No. C1400084

Site Name:	Frank Wear Cleaners
Site Address:	106 South 3rd Avenue, Yakima
F/S ID No.:	444
Cleanup Site No.:	4194

Dear Mr. Randall:

The State of Washington Department of Ecology (Ecology) has elected to delete portions of the work in the above referenced contract with Engineering Remediation/Resources Group, Inc (ERRG). The deletion in work results in a reduced sum of the total base bid amount for general conditions, well head assembly and well piping, electrical system, and site improvement and restoration. Bid items for the remediation building slab and remediation building installation are complete.

The total base bid amount due to the change of shall be $153,338.65 and includes all costs for materials, labor, equipment, overhead and profit.

Ecology will prepare a change order to incorporate the amount of its reduction into the contract. All terms and conditions of the contract remain in effect. Should you have any questions, do not hesitate to call the cleanup project manager, Jason Shira, at 509-454-7834.

Sincerely,

Valerie Bound

Valerie Bound
Central Regional Office Section Manager
Toxics Cleanup Program

cc: Jason Shira, Site Manager
Joe Ward, TCP Contracts Officer
Jill Kiernan, Hart Crowser

ERRG - Deletion of Work
Frank Wear Site
Yakima, Washington

ITEM NO.	SCHEDULE OF VALUES	ERRG ESTIMATED VALUE	ERRG Original Contract Amount		ERRG WORK Reduction		BALANCE REDUCTION
			% of Work Completed	Amount Earned	% of Work Completed	Amount Earned	
1	General Conditions A. Mob. Demob. Bonds, & Insurance Includes permits, temp. facilities & controls, utility identification/protection B. Project Administration and Submittals C. Construction Surveying D. Environmental Testing, Erosion Controls, Traffic Controls, Temp Fencing E. Load and Transport EFCI Equipment - Treatment Building F. Project Closeout	$55,324.26	100%	$55,324.26	85%	$47,025.62	-$8,298.64
2	Well Head Assemblies and Well Piping A. Construction of Well Head Assemblies B. Trenching for Well Piping C. Soil Stockpiling D. Haul and Dispose of Excavated Material as Hazardous Waste E. Haul and Dispose of Excavated Material as Non-Hazardous Waste F. Imported Clean Pipe Bedding Material G. Imported Clean Trench Backfill Material H. Installation of Well Piping I. Installation of Well Head Vaults	$81,122.46	100%	$81,122.46	71%	$57,807.86	-$23,314.60
3	Remediation Building Slab A. Area Preparation B. Soil Stockpiling C. Haul & Dispose of Excavated Material as Hazardous Waste D. Haul and Dispose of Excavated Material as Non-Hazardous Waste E. Optional Soil Testing and Reuse F. Import Clean Structural Backfill Material G. Placement, Compaction, & Testing of Subgrade H. Construct Formwork and Reinforcing Steel for Slab I. Cast-In-Place Concrete J. Concrete Finishing K. Concrete Testing	$5,383.78	100%	$5,383.78	100%	$5,383.78	$0.00
4	Remediation Building Installation A. Building Permit B. Install Remediation Building & Tank C. Pipe Connections at Building	$2,081.68	100%	$2,081.68	100%	$2,081.68	$0.00
5	Electrical System A. Electrical Permit B. Install Electrical Conduit and Wire C. Connections at Treatment Building D. Field and System Testing E. Telephone Service	$37,936.03	100%	$37,936.03	90%	$34,142.43	-$3,793.60
6	Site Improvements and Restoration A. Installation of Security Fencing B. Restore Asphalt Surfaces C. Restore Concrete Surfaces D. System Startup E. Final Grading F. Site Cleanup and Demobilization G. Construction Waste Management	$10,776.99	100%	$10,776.99	64%	$6,897.27	-$3,879.72
	TOTAL BID AMOUNT	$192,625.20		$192,625.20		$153,338.65	-$39,286.55

APPENDIX F
Hart Crowser Daily Field Reports

HARTCROWSER

FIELD REPORT

Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No 17800-23
Field Report No. 4
Page 1 of 1
DATE 9/6/13
S M T W (Th) (F) S

JOB Frank Wiar
LOCATION Yakima, WA
CLIENT WA Dept. of Ecology
PURPOSE OF OBSERVATIONS Well Installations
HC REPRESENTATIVE Jason Miles
HC PROJECT MANAGER Jill Kiernan
CONTRACTOR Cascade Drilling
CONTRACTOR REP. Jeffrey Johnson
ARRIVAL TIME: 0640
DEPARTURE TIME: 1440
WEATHER: Overcast
PERMIT NO.
JOB PHONE

COMMENTS: 0640- HC on site. Open gates.
0650- Cascade on site. 0720- Start drilling again on EXT-1
0850- Down to 20' on EXT-1. Possibly going to redo MW-9 monument also. Will need to rent a Jack Hammer.
1050 Reached 40' on EXT-1. Pushing outer casing now to 40'
HB 1140-1205- At the lunch
1255- Done with installation of EXT-1, except for monument. One drillers helper has been becoming.
INJ-4 well tag # is BHL 279 EXT-1 well tag # BHL 280
- Drillers are storing equipment in locked parking lot area.
1440- HC off site. Cascade will leave in ~5 minutes

BY: Jason Miles
HART CROWSER REPRESENTATIVE

REVIEWED BY:
HART CROWSER PROJECT MANAGER

I have read and understand the content of this Field Report
CONTRACTOR REPRESENTATIVE

HARTCROWSER
FIELD REPORT

Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No 17800-23
Field Report No. 5
Page 1 of 1
DATE 9/9/13
S (M) T W Th F S

JOB Frank Wear
LOCATION Yakima, WA
CLIENT Wa. Dept. of Ecology
PURPOSE OF OBSERVATIONS Extraction well installation
HC REPRESENTATIVE Chris Morton
CONTRACTOR Cascade Drilling
CONTRACTOR REP. Jeffery Johnson

ARRIVAL TIME: 0800
DEPARTURE TIME:
WEATHER: Sunny
HC PROJECT MANAGER Jill Kiernan
PERMIT NO.
JOB PHONE

COMMENTS: 0900 Cascade crew on the site, begins set up on Ext-5 Location begins by abandoning MW-3
- well chipped & hydrated
0935 - begin coring out existing well monument for Ext-5 installation
- overdrill well location, - pulled casing out, - bottom 5' broken off

1300 - finish drilling Ext-5 install PVC to 40' bgs pour 1 bag sand.

1315 Lunch - 1345

1440 finish pulling outer casing well completed to 39'2" after pulling out 40" during outer casing removal. 4" sump/cap, screened 38'10" to 18'10", sand to 17', bentonite chips to 2'
- begin installing concrete seal & monument.

1540 - set up to begin chipping (decommissioning) MW-4) for installation of EXT-8

1800 drilled outer casing to 20' bgs inner casing to 30' bgs. stop here for the day begin cleanup.

1900 off the site

BY: REVIEWED BY: I have read and understand the content of this Field Report

HART CROWSER REPRESENTATIVE | HART CROWSER PROJECT MANAGER | CONTRACTOR REPRESENTATIVE

HARTCROWSER
FIELD REPORT

Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No 17800-23
Field Report No. 6
Page 1 of 1
DATE 9/10/13 - 9/11/13
S M (T) + (W) Th F S

JOB Frank Wear
LOCATION Yakima, Wa
CLIENT Dept. of Ecology
PURPOSE OF OBSERVATIONS Extraction well installation
HC REPRESENTATIVE Chris Martin
HC PROJECT MANAGER Jill Kiernan
CONTRACTOR Cascade
CONTRACTOR REP. Jeffery Johnson

ARRIVAL TIME: 0700-1945/0700-1800
DEPARTURE TIME:
WEATHER: Sunny/Hot
PERMIT NO.
JOB PHONE

COMMENTS: 0700 - HC Rep & Cascade arrive on the site, begin set up, morning meeting, etc.
0800 - begin/continue drilling Ext-8
1100 - Ext-8, sand filter pack installed, begins to chip. drilled to 40'4", screened 40'-20'
1115 - move to Ext-6 to core concrete
1150 - begin drilling Ext-6
1310-1340 Lunch.
1610 - complete Ext-6 to 40' install PVC well & begin adding filter sand,
1720 - complete adding sand & bentonite begin clean up.
drilled to 40', well depth 39'6", screened 39'2" to 19'2", sand pack to 18', GW@15.8', bento chips to 2', concrete surface seal w/flush mounted monument.
1945 - off site

9/11/13
0700 - Arrive on the site, begin set up on Ext-7
0815 - Begin casing concrete @ Ext-7
1230 - completed drilling to 40' installed PVC well casing
1220-1300 - Lunch
1300 - begin pouring Sand into Ext-7
1400 - complet adding sand & bentonite plug, cleaning up to move on, still need to set Ext-7 monument
hole to 42', screened 41'2" to 21'2", sand to 18', water level @ 15.4', bento. chips to 2'
1530 - cut concrete for Ext-7
1700 - Drill to 20' begin cleanup for the day
1800 - Off site

BY: REVIEWED BY: I have read and understand the content of this Field Report

HART CROWSER REPRESENTATIVE | HART CROWSER PROJECT MANAGER | CONTRACTOR REPRESENTATIVE

HARTCROWSER
Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

FIELD REPORT

Job No 17800-23
Field Report No. 7
Page 1 of
DATE 9/12/13 - 9/13/13
S M T W (Th) (F) S

JOB Frank Wear
LOCATION Yakima, WA
CLIENT Dept. of Ecology
PURPOSE OF OBSERVATIONS Extraction Well Installation
HC REPRESENTATIVE Chris Martin
CONTRACTOR Cascade
CONTRACTOR REP. Jeffery Johnson

ARRIVAL TIME: 0700
DEPARTURE TIME:
WEATHER: Sunny / Hot
HC PROJECT MANAGER Jill Kiernan
PERMIT NO.
JOB PHONE

COMMENTS: 0700-HC rep & Cascade on the site to begin set up / safety meeting
0745 CM 0730-Set up on Ext-4 continue drilling from yesterday
0800-Safety meeting w/ CWMHC safety Rep & Jason Shira (Ecology)
0840-Cascade needs to replace rods due to worn threads.
1110-complete drilling to 40', begin cleaning hole & installing well casing
1150-complete well installation except concrete surface seal & monument.
1200-move rig to Ext-3 location.
1230-1330 Lunch
1430-drilled to between 10'-15' when drill rig is down for repairs.
Cascade is deciding what to do about 3 cracks in drill rig head,
1500-Well monument repairs to MW-9.
1630-off the site (HC) while Cascade continues to get drilling head fixed @ welders
-Cascade is using the drill rig to a welding shop for repairs

9/13/13
0740-HC rep on the site, Cascade set up on EXT-3
1100-Complete drilling EXT3 to 40', need to advance outer casing & clean hole before setting well
1135-casing installed
1235-1305-Lunch
1310-begin drilling Ext-2
1800-off the site Ext-2 drilled to 40', set well & clean up tomorrow

BY: REVIEWED BY: I have read and understand the content of this Field Report

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Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No. 17800-23

Field Report No. 8

Page 1 of 1

Job Frank Wear

Date 9/14/13

Setuday 9/14/13

0700 arrive on the site, begin cleaning out EXT-2 hole

0830 finish setting well & pulling casing

in storage area

38 drums +5 empty

~~4~~ are decon -2 from this week, I observed ~~one~~ 2 additional drum labeled #10 set in SE corner of storm water/decon area

1045 - HC off of the site gate key & clicker for Birdwood parking lot are stored in treatment building

- cascade remains on site to clean up & organize equipment

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Job No 17800-23 Task 8
Field Report No. 1
Page 1 of 1
DATE 10/28/13
S (M) T W Th F S

HARTCROWSER FIELD REPORT

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Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

JOB Frank Wear
ARRIVAL TIME: 0800
LOCATION Yakima, Wa
DEPARTURE TIME:
CLIENT Dept. of Ecology
WEATHER: Sunny / cold
PURPOSE OF OBSERVATIONS Groundwater Treatment System Installation
HC REPRESENTATIVE Chris Martin
HC PROJECT MANAGER Jill Kiernan
CONTRACTOR ERRG
PERMIT NO.
CONTRACTOR REP. Tim
JOB PHONE

COMMENTS:

0800 - HC Rep (Chris) arrives on the site to observe the groundwater treatment system (GTS) installation. ERRG (Subcontractor) on the site
· conduct safety meeting.
0830 - Begin moving 20+ drums from within fenced area of SVE system to outside fenced area (East of fence)
Visit Granite Quarry. -No power at quarry.
Discuss plan for GTS concrete pad construction & location
1130 - Continue discussions / Clarifications of pad location and SVE/GTS fence repair. Discuss well locations regarding differences in Plan drawings to actual (Previously discussed during site walk)
1345 - remove fence posts along west side of SVE enclosure.
1415 - Unload 3 tons of baserock for concrete pad subgrade.
1515 - off-site

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Job No. 17800-23 / Task 8

Field Report No. 2

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Job Frank Wear

Date 10/29/13

0700 - HC & ERRG on the site - complete H&S meeting
- ERRG continues to excavate 6" for GTS concrete pad subgrade. Final location of GTS pad is 10ft west of vapor GAC units foundation pad, 3ft south of existing fence (to be extended) to include GTS building within enclosure. Fence will be extended, giving GTS building 3ft space along North and west sides.
- Picking up supplies for piping and to begin trenching
0800 - measure injection well trenches & begin cutting trenches using asphalt cutter.
0930 - decide to route trench for Ext-2, 3, & 4 northward within sidewalk instead of within South 3rd Ave. Electrical pull boxes are needed within trench that cannot be in the street. Consulted with electrician about project. He provided ideas to slightly modify pump wiring within Ext. Vaults. These changes will need to be okayed by the Engineer prior to implementation.
1030 - Native soil under concrete pad has been compacted and is being tested for compaction by PSLA (subcontractor to ERRG), verbally passed test. No paperwork given/produced @ the time of the test, The proctor was collected yesterday. - ERRG adds baserock
1200 - PSLA on the site to measure pad subgrade density - verbally passed, again no paperwork produced @ time of test.
- ERRG continues to prep for concrete (framework)
1350 - Vaults arrive, 12 total, 4 smaller (~18x18x18) & 8 larger (~24x24x24)
1415 - Discuss drywell decommissioning options, decide on filling w/ concrete to ~3ft below ground surface.
- Pad Construction details - pad dimensions 8'x12'x4" thick #4 rebar used for reinforcement, grid spaced ~12" apart w/ ends ~4" from edge, wire tied together. Framework constructed of/using 2x4 lumber lifted ~0.5" off of subgrade (2"x4" lumber is actually 1.75"x3.5"), gap is filled in w/ small berm of subgrade material.

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Job No. 17800-23 / Task 8

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Job Frank wear Date 10/29/13

1415 – Concrete Pad Construction Notes Continued.

1430 - reinforced rebar is layed on subgrade, during concrete pouring, the grid is lifted to ~2" from bottom. This is not an accurate way to set rebar, sufficient spacers (Adobars) could not be purchased in time for concrete pour. Concrete leveled on top using 2x4 lumber scraping and rocking along top of 2x4 framework. Concrete was smoothed & leved then textured using broom once concrete was almost dry. (4 cubic yds of concrete used for pad & filling drywell).

1510 - Concrete truck off the site. ERRG continues working concrete.

1530 - most crews off the site

1615 - HC off the site Jason & Tim (ERRG) remain on site to cure/secure concrete.

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Job No. 17800-23 Task 8

Field Report No. 3

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Job Frank Wear.

Date 10/30/13

10/30/13

0700 safety & planning meeting

0730 begin cold removing asphalt in INJ trenches.

0810 begin excavating INJ-4 ~~INJ-3~~. trench width 24" excavated to ~38" deep., trench length is ~50' long, before intersects w/ INJ-3. includes (1) 45° bend

[1245 - lunch.]

Pipe is installed in trench, glued & allowed to cure at least 24hrs before testing

- Pipe sits on 6" Lift of compacted backfill material (Type bedding)
- (2) 45° bends bringing pipe from horizontal to vertical inside the vault.

Tracer wire is 12 AWG gauge PVC sleeve Jacket - Tracer wire cut to length to ensure there will be no segments or wire connections underground.

1600 - continue working on piping from INJ-4 to where it ~~connects to~~ passes INJ-3 determining best way

① set/glue endcaps on pipe segment in preparation of pressure testing pipes to allow some bedding material to be imported over straight segment of inj piping >6" layer over pipe. Pipe ends & 45° bend left exposed for surveying.

Trench backfill layers will be density tested @ least 1 every 200 linear ft. some Density testing is scheduled for tommorow where multiple layers can be tested during one visit. Native ~~backfill~~ soil will be reused as compacted fill. Proctor was collected under concrete pad for a baseline.

- temporary fence arrives

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Job No. 17800-23 / Task 8
Field Report No. 4
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Job Frank Wren
Date 10/31/13

10/31/13 Yesterday 4 truckloads of gravel arrived.
0700 - Safety meeting
0838 - attempt pressure test INJ-4. Pipe run from INJ-4 to wren it passes INJ-3 ① 838 to NE; leaking valve
② 0845 dropped to 100psi by 0851
- getting different valving system to stop leaks
- crew excavating from INJ-1 towards system.
0930 - are directly around INJ-1 wellmonument a thin layer of broken bottles & apparently burnt materials observed. Layer is ~1/4 inch thick & in the immediate area of INJ-1. The layer is 1 foot below ground surface & does not extend more than 3ft towards the GTS (east). PID reads 5ppm. No sample was collected & debris was not segregated Due to overall low volume & not a site COC.
- continue trying to pass pressure test ③ 150psi @ 945 dropped 20psi
④ 160psi @ 955
- Once passed, fittings were removed from each end of the pipe segment & capped. ⑤ 165psi @ 1118 to 160psi @ 1143 new fitting/gauge installed
Pipe run from compressor unit
1215 - continue digging trenches for INJ-1&2 & where pipe runs go south towards bubbler.
- add more pipe bedding (6" left above pipe) to segment that passed test.
- lunch
1345 - setting up perimeter fence.
- cutting INJ-4 pipe & resett removing ~6" from pipe before reconnecting - vertical segment of pipe moved & is now too close to INJ-4 wellhead. EFRG has dug out segment of ppe prior to 45° bend to remove 6"
1700 - completed trenching w/in private parking Lot. Pipe bedding placed & in the process of being compacted. problems w/ caveins. Temporary fence installed along East & west ends of Frank Wren property.

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Job No. 17800-23 Tasks 8
Field Report No. 5
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Job Frank Wear
Date 11/1/13 Friday

0730 - HC & ERRG on the site. H&S Meeting
0815 - begin setting up to continue laying pipe in trenches for INJ wells burying convergence pipe from INJ 4 to where it passes INJ-3. This segment of pipe was pressure tested & passed, but a segment of pipe (~6") was cut out after testing. This segment will be retested w/ entire INJ-4 convergence pipe. ERRG is aware they will need to re-excavate pipe if test fails to find the leak. The INJ-4 vault is being situated (alligned) & prepared for installation. Part of the INJ-4 trench extends beyond private property fence to the east. Still w/in private property but outside of fence. This small triangle of trench will be backfilled completely before leaving for the weekend for pedestrian safety.)
1045 - ERRG continues to backfill trenches in preperation for the weekend. trench from INJ-4 to INJ-3 completely backfilled to grade & compacted. ~6" of backfill over most other convergence pipe. Convergence pipe w/in parking lot nearly completely installed to Southern fence boundary. backfill will be re-excavated to ~-2' below grade once ready for asphalt. - Vault is also gravel backfilled into place, NOT measured, leveled or oriented in its final position.
1215 - finishing up cleanup for weekend. INJ-3 vault set into place compacted w/ gravel to the ground surface. The first segment of INJ-3 pipe (before 45° bend to west) is backfilled to the surface & compacted. There is a trench for a little beyond the truck parked in lot, trench backfilled so truck could be moved over the weekend w/o it backing into trench. Gravel, asphalt & excavated soil piles are covered for the weekend. NO waddles or diversion dams are in place. Side boundaries are fenced in, including Southern portion of private parking lot & East & west boundaries of Frank Wear property.
1230 - HC & ERRG off-site

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Job No. 17800-27/18

Field Report No. 6

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Job Frank Wear

Date 11/04/2013

0655- HC is on site. ERRG on site all ready
0710 Discuss plan and safety.
0720 Start removing fence, warming up equipment, etc.
0735 Back hoe was unable to lift treatment system.
0750 Starting to dig to expose existing SUE lines in between presched and treatment system. 0810 Exposed them at 2' 6" bg to top of pipe
0836 Tim with ERRG is on site with fittings.
~0850 truck dropped off backfill. Mini-back hoe arrived.
0910- Arrive load of backfill
0940- 3rd load of backfill Right now trenching from pad to injection wells and from EXT-1 towards system. Spoke with Tim. They plan on leaving 4 5's exposed right now
- Removed a fence post that was in the way while doing the trench. Will use temporary fence while construction is going on and putting it back once complete.
1010 Exposed power line near fence.
1017- 4th load of backfill arrives 1030- 5th load arrived.
1100- Found 3 lines running east to west in trench running under parking lot fence (6th Truck of backfill) Treatment light grey and white PVC New pad fittings
1130- Have taken several PID tests from both excavations All have been below 0.6 ppm.
1200- Spoke with Jill (HC) and Tim (ERRG). Decided they could do 6 inches below SUE pipe.
1220- 2 inch PVC line runs right across (or under) MW-2 monument concrete. A line 1.5-2' deep unmarked ~1 inch yellow line. Not sure what it is. 10' SW of MW-2
1230-1300 lunch. During lunch 2 kept working on placing 5th load.
1305- Jason Shira on site. Thinks old lines (metal) were sanding and irrigation. The yellow line, possibly electric to Ozone system

BY:

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Job No. 17800-23/Task 8

Field Report No. 6

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Job Frank Wear

Date 11/04/2013

ERRG is having to rent a larger piece of equipment to place the treatment system on the concrete pad.
1340 - Survey crew is on site to survey, in all the 45's.
Tim (ERRG) called in gas company to check out yellow line
1355 Cascade Natural Gas on site. Said that it looks like the line is not active.
1420 - Excavated to 3 feet across where water line is supposed to be, but there is none above 3'.
1520 - Closing up site with gates. Trenches are still open
1600 - ERRG and HC off site.

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Job No. 17800-23 Tio

Field Report No. 7

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Job Frank Wear

Date 11/5/2013

0655 - HC on site. ERRG already on site
0700-0710 - Health and Safety meeting.
Setting up.
0730 - Brad Jones (WMMF) on site for brief. 20 minutes.
0800 - Electrician is inspecting system. Have to build a separate concrete pad for transformer. Discussed with Jason Shira and Tim. Going to put on west of treatment pad and expand the fence.
0820 - Working on compacting 6 inch pipe base near EXT-1.
0840 - Jason Shira is off site. Laying pipe on top of compacted Gravel. Gravel compaction has not been inspected yet. As last trace working on pipes to ensure that there is no gravel or dirt in pipes.
- Waiting for electrical conduit to arrive.
1040 - Electrician is starting to set out conduit for electrical
1100 - Excavator noticed a difference in color in the base rock. It appeared to me that it was just wet. Did sheen and PID. <5 and NS
- Earlier had conversation with Jason and Tim. Going to start keeping area stockpiles separate. A detection of PCE was in the sample they collected last week. They will have to find a place to dispose of it.
1145 - Went to lunch
1210 - Utilities Plus on site for unidentified utility. One is water. Can only trace it to fence of daycare.
1250 - Individual on site to check compaction in parking lot - Did 5 tests - lowest 95.9! Average of 98.6. No documentation. As discussed with Jill earlier. Going to ~~drive~~ over the top of SV-1 line, since line has already been placed over it. Going over 6 inches with backfill material in between.
1400 - Starting on trenching for electrical conduit to transformer. Also starting eastern trench toward 3-6.
1615 - HC and ERRG off site. All PID tests today backed out.

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Job No. 17800-23/Task8
Field Report No. 8
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Job Frank Wear Date 11/06/2013

0650- HC is on site. Some of ERRG workers are here.
0705- 0720- Safety talk.
0744 - Some are working on electrical trench for treatment system. Others on trench heading in between existing system and daycare.
0830 Running out of room for soil stockpile. Rearranging some to make more room.
0900- Some of the crew is going to start trenching on CWMH facility - Earlier today ERRG assured me that the new water pipes will be 12" below the existing SVE lines. Removed old ozone treatment line.
1050- ERRG is being very careful while looking for 6 SVE lines that run from treatment system towards Daycare.
- Electric line runs along EXT-2 → EXT-4. 19" bgs. Going to be where vault needs to be.
~1200-1230 lunch.
Still working on trenches. As per a discussion with PM from HC, and decision made by ERRG, they are going to move closer to the treatment system fence and use 45° connections on the pipe to straighten out. So far today all PID samples from all excavations have been background, usually 0.0

1415- Surveyors are on site to survay in 45's
1440- Asked electrician about using existing 240 from building to supply the water treatment system. He said it's not ~~good~~ big enough.
1530- Continuing with backfill on EXT-1 lines
1600-1630- Starting cleanup to the east
1655- HC and ERRG off site.

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Job No. 17800-23
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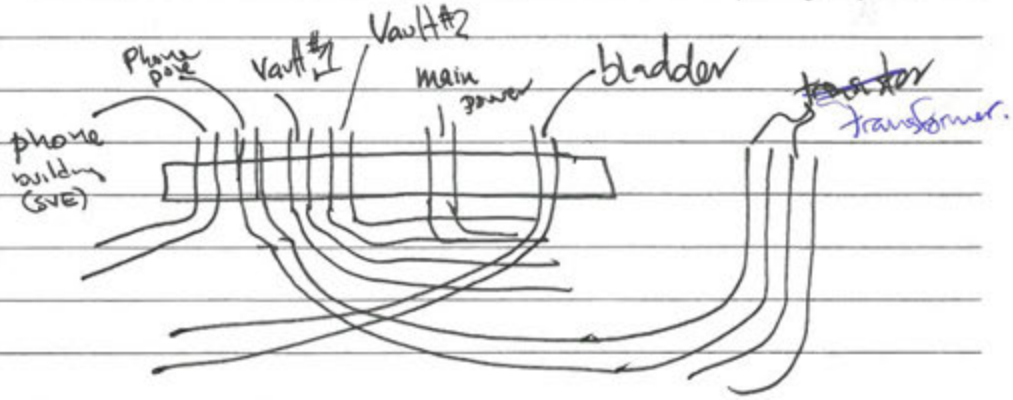
Job Frank Wear
Date 11/07/2013

0650 - HC is on site
0700-0710 - Safety Brief

Drum-1 EXT-3 drum 0806
Drum-2 EXT-4 drum 0810
0900-0930 collect samples with ETin ERRG from stockpiles
1000-1050 - Off site to send samples through Fedex.
- ERRG has been working on Trench EXT-2 → EXT-4. More compaction of gravel/ish several areas
1115-Spoke with operator (Ron) about the conduit being laid next to the water pipes. He said he was planning on putting bricks on water and then conduit. Spoke with Tim and wants to lay it beside, as the specs say.
1135- Jason Shira on site.
1200-1320 - lunch. Most workers only ½ hour lunch
- Showed ERRG the section in Specs about the connectors. They will get them from the electrician.

HC Rep Chris on the site. electrical conduit for treatment building approved by state inspector



BY: Jason N Matts
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REVIEWED BY: _____
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Job No. 17800-23

Field Report No.

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Job Frank Wear

Date 11/8/13

0700 - HC reps (Chris & Jason) onsite w/ ERRG & electrician
- safety meeting / fuel vehicles

0745 - Jason begins purging INJ wells.
- ERRG backfills trenches around GTS pad & near alley on FW property
- surveyors on the site to survey pipe elevations

1000 - continue purging INJ wells
- ERRG is backfilling around concrete pad over electrical lines.
- Trench & Vault for Ext-1 is complete, I meant
- Continue trenching East-west across FW property for (3) ext fluid lines
- also extending Ext-2, 3 & 4 water lines from system towards well location, making 2 45° bends for each of 3 lines. Starting near GTS pad southward bending towards East (S 3rd Ave).

5-4 truckloads of backfill delivered today (10am & 11am) 1130 1200 1255

1130 - begin pressure testing INJ wells
- procedure - slowly fill line w/ water from hydrostatic test pump machine. Pipe is open in vault to purge air bubbles. Once
- once line purged close off valve @ vault & allow pressure to build to 150 psi.
- once @ 150psi, close valve @ GTS & begin half hour test. ERRG has multiple gauge/valves set up, one on each INJ line. Once one line is set to 150 & Hydrostatic test pump is set up on next well to start again.

		time	psi
Test 1	INJ 2	1138	150
		1208	145
1	INJ 1	1140	160
		1224	155
1	INJ 4	1245	145
		1319	141
1	INJ 3	1300	145
		1330	141

1230 GTS building installed on pad & leveled.

1345 ERRG off-site HC remains onsite to complete testing

1500 HC off-site after purging INJ-1 through 4 & Ext-1 through 4. Ext-5 through 8 have not been purged

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Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No 17800-23
Field Report No.
Page 1 of 1
DATE 11/1/13
S (M) T W Th F S

JOB Frank Wear
LOCATION Yakima, WA
CLIENT Dept. of Ecology
PURPOSE OF OBSERVATIONS Oversee GTS installation
HC REPRESENTATIVE Chris Martin
HC PROJECT MANAGER Jill Kiernan
CONTRACTOR ERRG
CONTRACTOR REP. Tim.

ARRIVAL TIME: 0645
DEPARTURE TIME:
WEATHER: Clear, cold
PERMIT NO.
JOB PHONE

COMMENTS: 0645- HC arrives on the site to oversee GTS system installation
Discuss daily Plan, prep for trucks to arrive to haul off excavated soil from site. Large soil pile on east side of Frank Wear property to be hauled to local Landfill.
Several smaller soil piles on Northern portion of property are still remain pending analytical results.
0830- ERRG filling trench on CWC/MH property & setting vaults for Ext-2 & 3.
1st truck arrives for soil disposal), ERRG beginning to pull concrete East of Ext-3 towards Ext-4. ~~bed~~ of dump truck is lined before soil loaded.
0945- Trench 1 soil sample collected from ~2.5 feet bgs & 1.5 feet east of CW/MH/POW (side wall interface)
1300 - HC Rep picks up 2 well seals from Ferguson
1330 - ERRG continues to dig trench & lay pipe bedding for wells Ext-2 & 3 east of the CW/CMH property.
1600 off site

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11/1/13 truck count 1

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Field Report No.

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Job Frank Wear

Date 11/12/13

0700 - HC & ERRG & electrician on the site, conduct safety meeting.
- ERRG continues to dig trench along S 3rd ave.
- Pipes for Ext-5 through 8 are installed below ext 1 & 3 lines w/ 45° bends facing towards S 3rd Ave. ERRG states that they will be able to reach these stubbed off pipes (Ext 5-8) at a later date even though they are below current pipes.

0900 - Outage trenching
- HC installs new door handle & lock on GTS building.

1300 - ERRG has problems w/ caving in along S 3rd Ave ~30ft of sidewalk curb has (adjacent to road asphalt @ grade) has fallen. ERRG will remove curb & replace later.
- A rock chip has broken the a hit the Bucket my Shoe holder window & broke a chunk of glass off. The operator of Bucket my shoe was really angry. ERRG has set up a curtain & plywood along the work zone boundary security fence that was in-place when the rock hit the window.
- ERRG also works on well head convergence setup.
- 2 truckloads of ex. soil from stockpile w/ all ND was taken from site today. Remaining soil w/ detections was approved for disposal @ Yakima City Landfill

1630 - off the site

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Job No. 17800-23

Field Report No.

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Job Frank Wear

Date 11/12/13

0700 - HC & ERRG & electrician on the site, conduct safety meeting.
- ERRG continues to dig trench along S 3rd ave.
- Pipes for Ext-5 through 8 are installed below ext 1 & 3 lines w/ 45° bends facing towards S 3rd Ave. ERRG states that they will be able to reach these stubbed off pipes (Ext 5-8) at a later date even though they are below current pipes.

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1630 - off the site

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Job No. 17800-23

Field Report No.

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Job Frank Wear. Date 11/13/13

0700- HC & ERRG & electrician on the site.
- begin/continue trenches along SW 3rd ave
- laying pipe within trench. 4 lines for Ext-5 through 8 below 3 lines for Ext-2 through 4. tracer wires & utility Notification tape placed on/6" over each pipe. Electrical lines bunched up along outside (East side) of trench along upper level of pipes. (3 larger & 1 smaller) conduit for the 7 lines. Electrical pull-box placed immediately east of Ext-4 Vault. conduits for future installation of Ext-5 through 8 installed. Trench along 3rd ave is 4.5-5' deep. & 5' wide there is caving in along both walls of trench.
- Trucks are taking "clean" (ND on analytes) soil & PCS soil off of the site.
- Truck hauling contaminated soil from site w/ lined bed.
- Trucks delivering backfill material to site. delivered to west side of FW property & ~2 loads dropped on the pavement of S 3rd Ave

1000 - backfilling most of trench along 3rd ave to grade. electrical lines have been inspected. Ext 4 Vault is installed w/ NO concrete foundation - just gravel
- compaction is will be completed using excavator mounted hoe-pack which applies more pressure than the previous compactors. (Jumping jack & "turtle")
- Ext-2 through 4 have not been pressure tested yet.

1530- Ext-1 & 2 pumps installed in vaults. pump intakes set to 35' below original casing height. Ext-1 casing was cut 1' (12") to fit w/in vault Ext-2 casing was cut (6") to fit in vault. pump riser pipes are constructed of 1¼" sch 40 PVC & there is one ~20' section & one ~5' section connected w/ a threaded (galvanized) coupling which can be unthreaded upon removal.

- ERRG has discussed w/ the City of Yakima about paving infront of Bobbie my shoe. ERRG does not have to re-pave concrete curb along S 3rd Ave until next year. instead a temporary asphalt curb will be constructed. City will not require ERRG to pave trench across sidewalk. currently the patch is graveled to the surface. ~~I~~ we will discuss completing this patch w/ asphalt until next year.

1645- off the site

BY: REVIEWED BY: I have read and understand the content of this Field Report.

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HARTCROWSER

Job No. 17800-23

Field Report No.

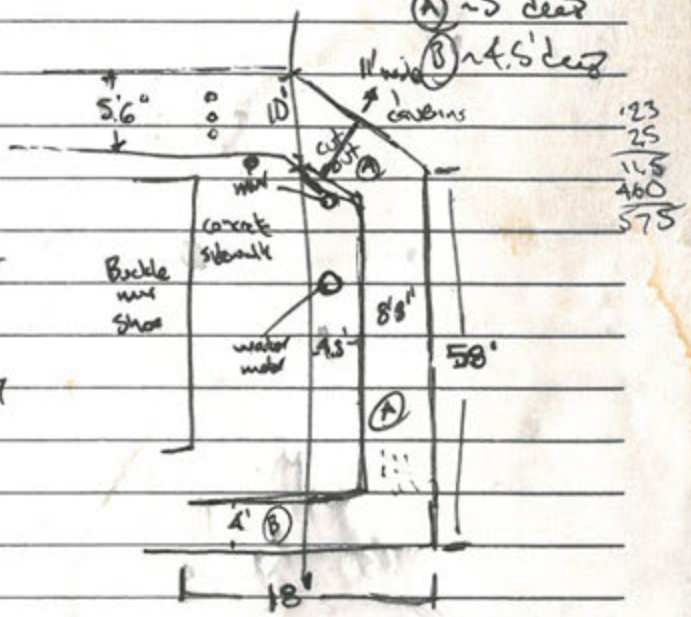
Page 1 of

Job Frank Wear

Date 11/14/13

0700 - HC, Erecs, & electrician (MBI) on the site, safety meeting stipulations
- Erecs begins/continues to remove soil from private parking lot N. of FW property. most soil is leaving site as contaminated either from various identified petroleum contaminants or other. This soil is loaded into dump trucks (pup & truck) lined bed.
- pipe runs for Ext-2-4 running South in front of GTS only have 2 utility tapes running along the two outer pipes. all three pipes have tracer wires.

1100 - continue trenching along NE corner of Building Shoe to N side of building. Soil is stockpiled w/ other contaminated media being removed from the site. only clean soil so far was excavated from trench w/in landscaped area of CNCMH property
- 1 15" total
Ext-3 16" removed from casing
4 14" removed



1130 - Ext-1 vault piping accessories completed
- begin setting up to move tankover to pad.

1400 - setting up for pressure testing Ext-1 & lower segments of Ext-2 through 4
- segments from well heads up to FW property

P. Testing fixture lines

					Time
			Ext-1 test 1	190	1315 1345 start
				187	1345 1345 end
156 psi	1622	4N 153 psi 1652	Ext-4	150	1600
149 psi	1618	147 psi 1650		146	1633
149 psi	1610	148 psi 1640	3		
150 psi	1650	147 psi 1720			
			2	152	1700
				150	1730

1730 off site - Ext-3 test failed

BY: REVIEWED BY: I have read and understand the content of this Field Report.

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HARTCROWSER
Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No. 17800-23
Field Report No.
Page 1 of

Job Frank Near
Date 11/15/13

0630 - HC & ERRG on the site
- Last night (Thursday, Nov. 14, 2013) during the pressure test for Ext-3 there was an apparent leak in pipe. ~~once the pipe was~~ Water would flow from pressure test machine on N. side corner of Buckley Shore to the end of the convergence w/in the vault. Once the valve was closed @ the vault, pressure would not build up in the pipe.
- ERRG begins test pit excavating to locate the leak. Test pits were completed along the NW corner of Buckley Shore. No leak was found. Water was observed pooling w/in Ext-3 vault. Test pitting was ~~can~~ stopped & ERRG had dug to the Ext-3 pipe. A leak was obvious @ the second 45° coupling which completed the 90° bend to the East - ☐ as shown on the drawing.

0730 - The monument for SPW-14 was knocked over a few inches during the test pitting. This well & MW-1 are very near the trench for the EXT wells. ~~Soil~~ Well pack material was not observed to be exposed during the original trenching for the Ext. Wells. No additional soil was excavated during todays leak detection test pitting. Just the monument & adjacent segment of concrete was moved. The lid was not removed to inspect for damage.

1050 - Repairs to Ext-3 near the vault complete. The convergence pipe was cracked @ the joint where the pipe begins to travel east. (Straight pipe was cracked not fitting)

Ext-3 segment
time start 1055 - 151 psi
time end 1125 - 148 psi

1300 - Paving of private parking lot & sidewalk west of Buckley Shore completed. Areas that will be concreted in include two trenches that cross the west half of the sidewalk, ~~&~~ 6" collar surrounding each vault. ~~monument. Five~~ & around SPW-14. The sidewalks will remain asphalt until next phase of work is complete. The vaults & well will be concreted next week.
The trench has been dug across the FW property. This trench will remain open until next week.

BY: REVIEWED BY: I have read and understand the content of this Field Report.

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Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No 17800-23
Field Report No.
Page 1 of
DATE 11/18/13
S (M) T W Th F S

JOB Frank Wiser
LOCATION Yakima, Wa
CLIENT Dept. of Ecology
PURPOSE OF OBSERVATIONS GTS installation
HC REPRESENTATIVE Chris Martin
HC PROJECT MANAGER Jill Kiernan
CONTRACTOR ERLG
CONTRACTOR REP. Ivan

ARRIVAL TIME: 0900
DEPARTURE TIME:
WEATHER: overcast
PERMIT NO.
JOB PHONE

COMMENTS: 0900 HC rep arrives on-site, ERLG on-site laying pipe in trench

(PM) Concrete pad for trasformer poured 8"s from GTS on West side 2'x3' (3' towards west @ NW corner of building - 6 pieces rebar 3in ea direction

N

1050 begin pressure testing on Ext-5 through 8 stubbed lines

✓ 1106	150 psi	146 psi	1137	⟸
1109	175 psi	165	1134	⟸
✓ 1058	154 psi.	152 psi	1128	⟸
✓ 1053	148 psi.	144 psi	1123	⟸
Test 2 1152	156 psi	1225	152 psi	(switched and gauges for test)

* call phone company to move phone line

1500 continue laying pipe & backfilling in lifts
1530 - Off at the site.

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gravel trucks 11

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Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No. 17800-23/Task 48
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Job Frank Wear, Date 11/19/13

0700 - HC, ERRG, & Electrician on-site, safety Meeting
- Electrician running wires through conduit & to GTS.
ERRG continuing to lay final stretch of pipe, & prepare for final pressure testing of Ext-2 trench/4. Truck removing soil & concrete/asphalt to "Anderson"

0900 - Setting well pumps into Ext-4 & 3

1030 - pressure testing complete runs of Ext-2, 3, & 4. Ext-1 was pressure tested previously on 11/14/13.

well	start pressure time	end pressure time
Ext 4	152 psi 10:28	151 psi 1058
Ext 2	151 psi 1037	151 psi 1107
Ext - 3	151 psi 1047	148 psi 1122

N
1 4 2 3
GTS facing East

wire colors
Blue - Ext-3 3/4hp
Red - Ext-2 (left
black - Ext-4
Red - Ext-1

1445 ~~wet~~ ~~test~~ trench backfill complete. pumps set into vaults
- electrical wires pulled. - Pumps Ext-1 through 4 are wired to the building but not connected w/in building. Batch tank pump & heater are wired to building but not connected w/in the building.

to do - Concrete vaults & damaged SPW-14 monuments
- fencing - complete ext piping to building
- pipe system to batch tank
- batch tank float sensors

BY: REVIEWED BY: I have read and understand the content of this Field Report.

HART CROWSER REPRESENTATIVE HART CROWSER PROJECT MANAGER CONTRACTOR REPRESENTATIVE

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Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No. 17800-23 / Ext 8

Field Report No. 17

Page 1 of 1

Job Frank Wear

Date 11/20/13

0700 - HC & ERRG on the site, Safety Meeting.
0730 - finish backfilling & cleaning up trench around Ext-3 vault.
This was the area where the cracked pipe was fixed.
- Cleaning up parking lot

BY:

REVIEWED BY:

I have read and understand the content of this Field Report.

HART CROWSER REPRESENTATIVE

HART CROWSER PROJECT MANAGER

CONTRACTOR REPRESENTATIVE

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Hart Crowser, Inc.
Five Centerpointe Drive, Suite 240
Lake Oswego, Oregon 97035-8652
Fax 503.620.6918
Tel 503.620.7284

Job No 17800-23/T8
Field Report No. _____
Page 1 of _____
DATE 12/11/13
S M T (W) Th F S

JOB Frank Wear
LOCATION Yakima, WA
CLIENT Dept. of Ecology
PURPOSE OF OBSERVATIONS GTS installation oversight
HC REPRESENTATIVE Chris
HC PROJECT MANAGER Jill
CONTRACTOR _____
CONTRACTOR REP. _____

ARRIVAL TIME: _____
DEPARTURE TIME: _____
WEATHER: Clear / cold
PERMIT NO. _____
JOB PHONE _____

COMMENTS:

0900 - Arrive on-site, many INT & EXT well conveyance pipes burst w/in GTS. Gauges & flow totalizers affected as well
Removed all flow through meters, valve, & gauge sections of conveyance pipe from w/in GTS for rebuilding ~~pumps~~ (vertically installed sections)
Removing pipe was inspected for damage w/ none found.

From top of valve left in place to union on top

INJ			Ext			
1	2	3	1	~~2~~	~~3~~ ~~4~~	5 6 7 8
36"	36 1/8"	35 7/8"	38 11/16	39 1/8	39 1/8	39 1/16
4	5	~~6~~	5	6	7	8
35 1/16"	35 1/8		39 1/16"	37"	39"	39"

BY: REVIEWED BY: I have read and understand the content of this Field Report

HART CROWSER REPRESENTATIVE | HART CROWSER PROJECT MANAGER | CONTRACTOR REPRESENTATIVE

Frank Wear
Pressure Test Results

Pressure testing per Specification Division 02 Section 02 71 13 3.05 Pipe Testing and Inspection. Each segment of pipe shall be pressure tested by filling with water and allowing pressure to build to 150 psi. Once water tight, the line must maintain 150 psi for 30 minutes with a pressure loss of no more than 5 psi.

Test #	Well ID	Date: 10/31/13	Complete Run of Pipe ND or Segment of Pipe X
1	INJ-4	Description of Pipe Segment: Segment of INJ-4 that runs up to INJ-3. Testing end of pipe fittings/pressure testing.	
Pass/Fail: fail		START Time/Pressure: 0838 / 150 psi	END Time/Pressure: ____
		If fail, reason for failure: Leaking valve instantly	

Test #	Well ID	Date: 10/31/13	Complete Run of Pipe ___ or Segment of Pipe X
2	INJ-4	Description of Pipe Segment: Same as above INJ-4 to parallel w/ INJ-3	
Pass/Fail: fail		START Time/Pressure: 0845 / 150 psi	END Time/Pressure: 0851 / 100 psi
		If fail, reason for failure: Leaking valve	

Test #	Well ID	Date: 10/31/13	Complete Run of Pipe ___ or Segment of Pipe X
3	INJ-4	Description of Pipe Segment: Same as above	
Pass/Fail: fail		START Time/Pressure: 0945 / 150 psi	END Time/Pressure: 0945 / 130 psi
		If fail, reason for failure: instant loss of 20 psi	

Test #	Well ID	Date: 10/31/13	Complete Run of Pipe ___ or Segment of Pipe X
4	INJ-4	Description of Pipe Segment: Same as above	
Pass/Fail: fail		START Time/Pressure: 0959 / 160 psi	END Time/Pressure:
		If fail, reason for failure: Replaced fittings	

Test #	Well ID	Date: 10/31/13	Complete Run of Pipe ___ or Segment of Pipe X
5	INJ-4	Description of Pipe Segment: Same as above	
Pass/Fail: pass		START Time/Pressure: 1118 / 165 psi	END Time/Pressure: 1148 / 160 psi
		If fail, reason for failure:	

Test #	Well ID	Date:	Complete Run of Pipe ___ or Segment of Pipe ___
		Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
		If fail, reason for failure:	

Frank Wear
Pressure Test Results

Pressure testing per Specification Division 02 Section 02 71 13 3.05 Pipe Testing and Inspection. Each segment of pipe shall be pressure tested by filling with water and allowing pressure to build to 150 psi. Once water tight, the line must maintain 150 psi for 30 minutes with a pressure loss of no more than 5 psi.

Test #	Well ID	Date: 11/8/13	Complete Run of Pipe X or Segment of Pipe___
6	INJ2	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass		1138 / 150 psi	1208 / 145 psi
		If fail, reason for failure:	

Test #	Well ID	Date: 11/8/13	Complete Run of Pipe X or Segment of Pipe___
7	INJ-1	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass		1148 / 160 psi	1224 / 155 psi
		If fail, reason for failure:	

Test #	Well ID	Date: 11/8/13	Complete Run of Pipe X or Segment of Pipe___
8	INJ-4	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass*		1245 / 145 psi	1319 / 141 psi
		If fail, reason for failure:	
		* pressure would not go to 145 not 150 psi	

Test #	Well ID	Date: 11/8/13	Complete Run of Pipe X or Segment of Pipe___
9	INJ-3	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass*		1330 / 145 psi	1330 / 141 psi
		If fail, reason for failure:	
		*	

Test #	Well ID	Date:	Complete Run of Pipe ___ or Segment of Pipe___
		Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
		If fail, reason for failure:	

Test #	Well ID	Date:	Complete Run of Pipe ___ or Segment of Pipe___
		Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
		If fail, reason for failure:	

Frank Wear
Pressure Test Results

Pressure testing per Specification Division 02 Section 02 71 13 3.05 Pipe Testing and Inspection. Each segment of pipe shall be pressure tested by filling with water and allowing pressure to build to 150 psi. Once water tight, the line must maintain 150 psi for 30 minutes with a pressure loss of no more than 5 psi.

Test #	Well ID	Date: 11/14/13	Complete Run of Pipe X or Segment of Pipe___
10	Ext-1	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
pass		1515 / 190psi	1545 / 187psi
		If fail, reason for failure:	

Test #	Well ID	Date: 11/14/13	Complete Run of Pipe X or Segment of Pipe___
11	Ext-4	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
pass		1600 / 150psi	1638 / 146psi
		If fail, reason for failure:	

Test #	Well ID	Date: 11/14/13	Complete Run of Pipe X or Segment of Pipe___
12	Ext-2	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
pass		1700 / 152psi	1730 / 150psi
		If fail, reason for failure:	

Test #	Well ID	Date: 11/14/13	Complete Run of Pipe X or Segment of Pipe___
13	Ext-3	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
fail			
		If fail, reason for failure: wont hold any pressure (Pipe cracked @ vault. Fixed.)	

Test #	Well ID	Date: 11/15/13	Complete Run of Pipe X or Segment of Pipe___
14		Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass.		1055 / 151psi	1125 / 148psi
		If fail, reason for failure:	

Test #	Well ID	Date:	Complete Run of Pipe ___ or Segment of Pipe___
		Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
		If fail, reason for failure:	

Frank Wear
Pressure Test Results

Pressure testing per Specification Division 02 Section 02 71 13 3.05 Pipe Testing and Inspection. Each segment of pipe shall be pressure tested by filling with water and allowing pressure to build to 150 psi. Once water tight, the line must maintain ~~150~~ 60 psi for 30 minutes with a pressure loss of no more than 5 psi.

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
1	INJ-4	Description of Pipe Segment:	
Pass/Fail: Fail		START Time/Pressure: 12:30 / 60psi.	END Time/Pressure: 12:45 / 45ps.
		If fail, reason for failure: Slow consistent ~~tea~~ Loss of pressure	

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
2	INJ-3	Description of Pipe Segment:	
Pass/Fail: Pass		START Time/Pressure: 1240 / 65psi.	END Time/Pressure: 1310 / 65
		If fail, reason for failure:	

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
3	INJ-4	Description of Pipe Segment:	
Pass/Fail: Fail		START Time/Pressure: 1250 / 60	END Time/Pressure
		If fail, reason for failure: Slow consist. loss of pressure	

Test #	Well ID	Date:	Complete Run of Pipe X or Segment of Pipe___
4	INJ-2	Description of Pipe Segment:	
Pass/Fail: Pass		START Time/Pressure: 1323 / 62psi.	END Time/Pressure: 1353 / 58psi
		If fail, reason for failure:	

Test #	Well ID	Date:	Complete Run of Pipe X or Segment of Pipe___
5	INJ-4	Description of Pipe Segment:	
Pass/Fail: Fail		START Time/Pressure: 1343 / 58psi.	END Time/Pressure: 1445 / 45 psi
		If fail, reason for failure: Slow consistent loss of pressure	

Test #	Well ID	Date:	Complete Run of Pipe ___ or Segment of Pipe___
6	INJ-1	Description of Pipe Segment:	
Pass/Fail: Pass		START Time/Pressure: 1400 / 62psi	END Time/Pressure: 1430 / 62psi
		If fail, reason for failure:	

INJ 4 still fails

Frank Wear
Pressure Test Results

Pressure testing per Specification Division 02 Section 02 71 13 3.05 Pipe Testing and Inspection. Each segment of pipe shall be pressure tested by filling with water and allowing pressure to build to 150 psi. Once water tight, the line must maintain 150 psi for 30 minutes with a pressure loss of no more than 5 psi.

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
7	Ext-1	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass		1430 / 60psi	1500 / 57psi
		If fail, reason for failure:	

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
8	Ext-4	Description of Pipe Segment: ~~15~~	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass		1545 / 62psi	1620 / 62psi
		If fail, reason for failure:	

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
9	Ext-2	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass		1520 / 60	1550 / 60
		If fail, reason for failure:	

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
10	Ext-3	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
Pass		1600 / 62 psi	1630 / 62psi
		If fail, reason for failure:	

Test #	Well ID	Date: 1/13/14	Complete Run of Pipe X or Segment of Pipe___
11	INJ-4	Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
fail		1620 / 60psi	1730 / 35psi
		If fail, reason for failure: X It is believed that a valve may be slowly leaking. The pressure	

Test #	Well ID	Date:	Complete Run of Pipe ___ or Segment of Pipe___
		Description of Pipe Segment:	
Pass/Fail		START Time/Pressure	END Time/Pressure
		If fail, reason for failure:	

⇒ Slowly drops to 35psi & holds there. NO Leaks can be observed though. The pipe segment can hold 35psi which is higher than operating pressures for injection wells.

Frank Wear 17800-23/Task 8
Final Site Inspection
ERRG

Date: 1/13/14

Pumps and Conveyance lines

- [ ] Pressure test conveyance lines to 60 psi. hold for 30 minutes with less than 5 psi drop.
  - [x] INJ-1
  - [x] INJ-2
  - [x] INJ-3
  - [ ] INJ-4
  - [x] EXT-1
  - [x] EXT-2
  - [x] EXT-3
  - [x] EXT-4

  holds 35psi
- [x] Power up pumps until flow regisers through totalizer and into tank.
  - [x] EXT-1
  - [x] EXT-2
  - [x] EXT-3
  - [x] EXT-4
- [ ]
- [ ]
- [ ]

System Checks

- [ ] Install/Check Phone line connection } needs programming, but does have power
- [ ] Test system call out
- [x] Power to heater in tank — can only check once water in tank / does get power.
- [x] Power to mixer in tank.
- [x] Power to transfer pump. Register through injection totalizer
- [x] Complete winterizing exposed pipes
- [ ]
- [ ]
- [ ]

Additional Site

- [x] Repatch conrete SVE monument
- [ ] Concrete/Asphalt rubble pile -
- [x] General site garbage/recycling removed from site.
- [x] pressure wash — ~~Pathways property~~ Lot to the north - yet to be completed
- [ ] Compound Fence (Northside from power washing)
- [ ] Site grading

Pathways Property

- [ ] Clean Pathways parking lot
- [ ] irrigation line. (drip line)
- [ ] landscape fabric.
- [ ] Vegetation
- [ ]
- [ ]

Additional

- [ ] INJ well trench elevation brought up to grade
- [ ] Remove additional temp. fence.