MAIL TO:
Division of Water Quality
Utah Department of Environmental Quality
Salt Lake City, Utah 84114-4870

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JAN 04 2018
UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

Application No.:_____
Date Received:_____
(leave both lines blank)

UTAH GROUND WATER DISCHARGE PERMIT APPLICATION

Part A - General Facility Information

Please read and follow carefully the instructions on this application form. Please type or print, except for signatures. This application is to be submitted by the owner or operator of a facility having one or more discharges to groundwater. The application must be signed by an official facility representative who is: the owner, sole proprietor for a sole proprietorship, a general partner, an executive officer of at least the level of vice president for a corporation, or an authorized representative of such executive officer having overall responsibility for the operation of the facility.

1. **Administrative Information.** Enter the information requested in the space provided below, including the name, title and telephone number of an agent at the facility who can answer questions regarding this application.

   Facility Name: Utah Department of Transportation (UDOT)

   Mail Address: 210 West 800 South, Richfield, Utah 84701
   (Number & Street, Box and/or Route, City, State, Zip Code)

   Facility Legal Location* County: Sevier
   T. 25 S, R. 4W, Sec. 22, _____ 1/4 of _____ 1/4,
   Lat. 38 ° 36 ' 21 "N.Long. 112 ° 13 ' 56 "W
   *Note: A topographic map or detailed aerial photograph should be used in conjunction with a written description to depict the location of the facility, points of ground water discharge, and other relevant features/objects.

   Contact's Name: Rick Torgerson Phone No.:(435) 201-1844
   Title: UDOT- Region 4 Director

2. **Owner/Operator Information.** Enter the information requested below, including the name, title, and phone number of the official representative signing the application.

   Owner
   Name: UDOT Phone No.:(435) 201-1844

   Mail Address: 210 West 800 South, Richfield, Utah 84701
   (Number & Street, Box and/or Route, City, State, Zip Code)

   Operator
   Name:_____ Phone No.:(____)_____
   (If different than Owner's above)

   Mail Address:_____
   (Number & Street, Box and/or Route, City, State, Zip Code)

   Official Representative
   Name:_____ Phone No.:(____)_____

   Title:_____

3. **Facility Classification** (check one)

   [X] New Facility
   [ ] Existing Facility
   [ ] Modification of Existing Facility

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DWQ-2018-000165

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4. **Type of Facility** (check one)

[ ] Industrial
[ ] Mining
[ ] Municipal
[ ] Agricultural Operation
[X] Other, please describe: Waste water Collection and Evaporation Facility

5. **SIC/NAICS Codes:**_____
Enter Principal 3 Digit Code Numbers Used in Census & Other Government Reports

6. **Projected Facility Life:** 3 years

7. **Identify principal processes used, or services preformed by the facility. Include the principal products produced, and raw materials used by the facility:**
Waste water collection and evaporation facility will be constructed for the containment of waste water created by the hydro-demolition of bridge decks on Interstate 70. Approximately 14 bridge decks will be hydro-demolished from Milepost 7 to to Milepost 21.

8. **List all existing or pending Federal, State, and Local government environmental permits:**

		Permit Number
[X]	NPDES or UPDES (discharges to surface water)	UTRC00000
[ ]	CAFO (concentrated animal feeding operation)	
[ ]	UIC (underground injection of fluids)	
[ ]	RCRA (hazardous waste)	
[ ]	PDS (air emissions from proposed sources)	
[ ]	Construction Permit (wastewater treatment)	
[ ]	Solid Waste Permit (sanitary landfills, incinerators)	
[ ]	Septic Tank/Drainfield	
[ ]	Other, specify_____	

9. Name, location (Lat._____°_____'_____"N,Long._____°_____'_____"W) and description of: each well/spring (existing, abandoned, or proposed), water usage(past, present, or future); water bodies; drainages; well-head protection areas; drinking water source protection zones according to UAC 309-600; topography; and man-made structures within one mile radius of the point(s) of discharge site. Provide existing well logs (include total depth and variations in water depths).

Name	Location	Description	Status	Usage
63-229	38°36'26" 112°13'25"	Water Well	Active	.015CFS
63-1816	38°35'54" 112°13'47"	Water Well	Active	.015CFS
63-64	38°36'05" 112°13'50"	Water Well	Active	.015CFS
63-2312	38°36'13" 112°13'20"	Water Well	Active	.015CFS
63-2301	38°36'13" 112°13'20"	Water Well	Active	.015CFS
63-2407	38°36'31" 112°13'47"	Water Well	Active	.015CFS
63-4288	38°36'20" 112°13'51"	Water Well	Active	1 Acre Feet

The above information must be included on a plat map and attached to the application.

Part B - General Discharge Information

Complete the following information for each point of discharge to ground water. If more than one discharge point exists, photocopy and complete this Part B form for each discharge point.

1. **Location** (if different than Facility Location in Part A): County: N/A
   T._____, R._____, Sec._____, _____1/4 of _____1/4,
   Lat._____°_____'_____"N.Long._____°_____'_____"W

2. **Type of fluid to be Discharged or Potentially Discharged**
   (check as applicable)

   Discharges (fluids discharged to the ground)

   [ ] Sanitary Wastewater: wastewater from restrooms, toilets, showers and the like
   [ ] Cooling Water: non-contact cooling water, non contact of raw materials, intermediate, final, or waste products
   [ ] Process Wastewater: wastewater used in or generated by an industrial process
   [ ] Mine Water: water from dewatering operations at mines
   [ ] Other, specify:_____

   Potential Discharges (leachates or other fluids that may discharge to the ground)

   [ ] Solid Waste Leachates: leachates from solid waste impoundments or landfills
   [ ] Milling/Mining Leachates: tailings impoundments, mine leaching operations, etc.
   [ ] Storage Pile Leachates: leachates from storage piles of raw materials, product, or wastes
   [ ] Potential Underground Tank Leakage: tanks not regulated by UST or RCRA only
   [X] Other, specify: Waste Water From Hydro-demolition Activities

3. **Discharge Volumes**
   For each type of discharge checked in #2 above, list the volumes of wastewater discharged to the ground or ground water. Volumes of wastewater should be measured or calculated from water usage. If it is necessary to estimate volumes, enclose the number in parentheses. Average daily volume means the average per operating day: ex. For a discharge of 1,000,000 gallons per year from a facility operating 200 days, the average daily volume is 5,000 gallons.

Discharge Type:	Daily Discharge Volume (Average)	(Maximum)	all in units of
N/A			

4. **Potential Discharge Volumes**
   For each type of potential discharge checked in #2 above, list the maximum volume of fluid that could be discharged to the ground considering such factors as: liner hydraulic conductivity and operating head conditions, leak detection system sensitivity, leachate collection system efficiency, etc. Attach calculation and raw data used to determine said potential discharge.

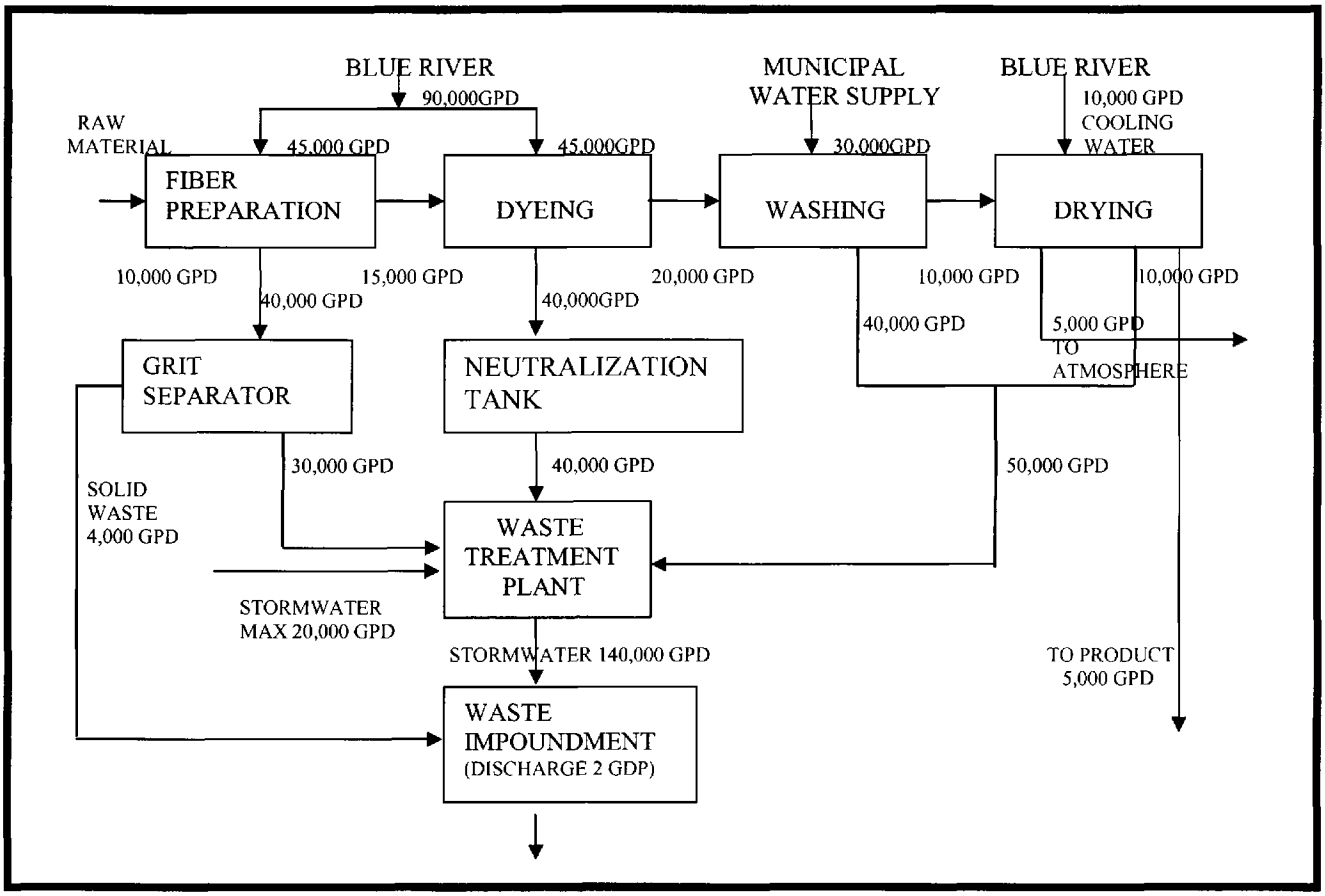
Discharge Type:	Daily Discharge Volume (Average)	(Maximum)	all in units of
Waste Water	No discharge anticipated due to non-permeable pond liner & leak collection		

5. Means of Discharge or Potential Discharge (check one or more as applicable)

- [x] lagoon, pit, or surface impoundment (fluids)
- [ ] land application or land treatment
- [ ] discharge to an ephemeral drainage (dry wash, etc.)
- [ ] storage pile
- [ ] landfill (industrial or solid wastes)
- [ ] other, specify_____
- [ ] industrial drainfield
- [ ] underground storage tank
- [ ] percolation/infiltration basin
- [ ] mine heap or dump leach
- [ ] mine tailings pond

6. Flows, Sources of Pollution, and Treatment Technologies

Flows. Attach a line drawing showing: 1) water flow through the facility to the ground water discharge point, and 2) sources of fluids, wastes, or solids which accumulate at the potential ground water discharge point. Indicate sources of intake materials or water, operations contributing wastes or wastewater to the effluent, and wastewater treatment units. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and wastewater outfalls. If a water balance cannot be determined, provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures. See the following example.



7. Discharge Effluent Characteristics

Established and Proposed Ground Water Quality Standards - Identify wastewater or leachate characteristics by providing the type, source, chemical, physical, radiological, and toxic characteristics of wastewater or leachate to be discharged or potentially discharged to ground water (with lab analytical data if possible). This should include the discharge rate or combination of discharges, and the expected concentrations of any pollutant (mg/l). If more than one discharge point is used, information for each point must be provided.

Hazardous Substances - Review the present hazardous substances found in the Clean Water Act, if applicable. List those substances found or believed present in the discharge or potential discharge.

Part C - Accompanying Reports and Plans

The following reports and plans should be prepared by or under the direction of a professional engineer or other ground water professional. Since ground water permits cover a large variety of discharge activities, the appropriate details and requirements of the following reports and plans will be covered in the pre-design meeting(s). For further instruction refer to the Ground Water Permit Application Guidance Document.

8. Hydrogeologic Report

Provide a Geologic Description, with references used, that includes as appropriate:

Structural Geology – regional and local, particularly faults, fractures, joints and bedding plane joints;
Stratigraphy – geologic formations and thickness, soil types and thickness, depth to bedrock;
Topography – provide a USGS MAP (7 ½ minute series) which clearly identifies legal site location boundaries, indicated 100 year flood plain area and applicable flood control or drainage barriers and surrounding land uses.

Provide a Hydrologic Description, with references used, that includes:
Ground water – depths, flow directions and gradients. Well logs should be included if available. Include name of aquifer, saturated thickness, flow directions, porosity, hydraulic conductivity, and other flow characteristics, hydraulic connection with other aquifers or surface sources, recharge information, water in storage, usage, and the projected aerial extent of the aquifer. Should include projected ground water area of influence affected by the discharge. Provide hydraulic gradient map indicating equal potential head contours and ground water flow lines. Obtain water elevations of nearby wells at the time of the hydrologic investigation. Collect and analyze ground water samples from the uppermost aquifer which underlies the discharge point(s). Historic data can be used if the applicant can demonstrate it meets the requirements contained within this section. Collection points should be hydraulically up and downgradient and within a one-mile radius of the discharge point(s). Ground water analysis should include each element listed in Ground Water Discharge Permit Application, Part B7.
NOTE Failure to analyze for background concentrations of any contaminant of concern in the discharge or potential discharge may result in the Executive Secretary's presumptive determination that zero concentration exist in the background ground water quality.
Sample Collection and Analysis Quality assurance – sample collection and Preservation must meet the requirements of the EPA RCRA Technical Enforcement Guidance Document, OSWER-9959.1, 1986 [UAC R317-6-6.3(I,6)]. Sample analysis must be performed by State of Utah certified laboratories and be certified for each of the parameters of concern. Analytical methods should be selected from the following sources [UAC R317-6-6.3L]: (Standard Methods for the Examination of Water and Wastewater, 20th Ed.,1998; EPA, Methods for Chemical Analysis of Water and Wastes, 1983; Techniques of Water Resources Investigation of the U.S. Geological Survey, 1998, Book 9; EPA Methods published pursuant to 40 CFR Parts 141, 142, 264 (including Appendix IX), and 270. Analytical methods selected should also include minimum detection limits below both the Ground Water Quality Standards and the anticipated ground water protection levels. Data shall be presented in accordance of accepted hydrogeolgic standards and practice.

Provide Agricultural Description, with references used, that includes:
If agricultural crops are grown within legal boundaries of the site the discussion must include: types of crops produced; soil types present; irrigation system; location of livestock confinement areas (existing or abandoned).

Note on Protection Levels:

After the applicant has defined the quality of the fluid to be discharged (Ground Water Discharge Permit Application, Part B), characterized by the local hydrogeologic conditions and determined background ground water quality (Hydrogeologic Report), the Executive Secretary will determine the applicable ground water class, based on: 1) the location of the discharge point within an area of formally classified ground water, or the background value of total dissolved solids. Accordingly, the Executive Secretary will determine applicable protection levels for each pollutant of concern, based on background concentrations and in accordance with UAC R317-6-4.

9. **Ground Water Discharge Control Plan:**
   Select a compliance monitoring method and demonstrate an adequate discharge control system. Listed are some of the Discharge Control Options available.

   No Discharge – prevent any discharge of fluids to the ground water by lining the discharge point with multiple synthetic and clay liners. Such a system would be designed, constructed, and operated to prevent any release of fluids during both the active life and any post-closure period required.

   Earthen Liner – control the volume and rate of effluent seepage by lining the discharge point with a low permeability earthen liner (e.g. clay). Then demonstrate that the receiving ground water, at a point as close as practical to the discharge point, does not or will not exceed the applicable class TDS limits and protection levels* set by the Executive Secretary. This demonstration should also be based on numerical or analytical saturated or unsaturated ground water flow and contaminant transport simulations.

   Effluent Pretreatment – demonstrate that the quality of the raw or treated effluent at the point of discharge or potential discharge does not or will not exceed the applicable ground water class TDS limits and protection levels* set by the Executive Secretary.

   Contaminant Transport/Attenuation – demonstrate that due to subsurface contaminant transport mechanisms at the site, raw or treated effluent does not or will not cause the receiving ground water, at a point as close as possible to the discharge point, to exceed the applicable class TDS limits and protection levels* set by the Executive Secretary.

   Other Methods – demonstrate by some other method, acceptable to the Executive Secretary, that the ground water class TDS limits and protection levels* will be met by the receiving ground water at a point as close as practical to the discharge point.

   *If the applicant has or will apply for an alternate concentration limit (ACL), the ACL may apply instead of the class TDS limits and protection levels.

   Submit a complete set of engineering plans and specifications relating to the construction, modification, and operation of the discharge point or system. Construction Permits for the following types of facilities will satisfy these requirements. They include: municipal waste lagoons; municipal sludge storage and on-site sludge disposal; land application of wastewater effluent; heap leach facilities; other process wastewater treatment equipment or systems.

   Facilities such as storage piles, surface impoundments and landfills must submit engineering plans and specifications for the initial construction or any modification of the facility. This will include the design data and description of the leachate detection, collection and removal system design and construction. Provide provisions for run on and run-off control.

10. **Compliance Monitoring Plan:**
The applicant should demonstrate that the method of compliance monitoring selected meets the following requirements:

Ground Water Monitoring – that the monitoring wells, springs, drains, etc., meet all of the following criteria: is completed exclusively in the same uppermost aquifer that underlies the discharge point(s) and is intercepted by the upgradient background monitoring well; is located hydrologically downgradient of the discharge point(s); designed, constructed, and operated for optimal detection (this will require a hydrogeologic characterization of the area circumscribed by the background sampling point, discharge point and compliance monitoring points); is not located within the radius of influence of any beneficial use public or private water supply; sampling parameters, collection, preservation, and analysis should be the same as background sampling point; ground water flow direction and gradient, background quality at the site, and the quality of the ground water at the compliance monitoring point.

Source Monitoring – must provide early warning of a potential violation of ground water protection levels, and/or class TDS limits and be as or more reliable, effective, and determinate than a viable ground water monitoring network.

Vadose Zone Monitoring Requirements – Should be: used in conjunction with source monitoring; include sampling for all the parameters required for background ground water quality monitoring; the application, design, construction, operation, and maintainence of the monitoring system should conform with the guidelines found in: Vadose Zone Monitoring for Hazardous Waste Sites; June 1983, KT-82-018(R).

Leak Detection Monitoring Requirements – Should not allow any leakage to escape undetected that may cause the receiving ground water the exceed applicable ground water protection levels during the active life and any required post-closure care period of the discharge point. This demonstration may be accomplished through the use of numeric or analytic, saturated or unsaturated, ground water flow or contaminant transport simulations, using actual filed data or conservative assumptions. Provide plans for daily observation or continuous monitoring of the observation sump or other monitoring point and for the reporting of any fluid detected and chemical analysis thereof.

Specific Requirements for Other Methods – Demonstrate that: the method is as or more reliable, effective, and determinate than a vable ground water monitoring well network at detecting any violation of ground water protection levels or class TDS limits, that may be caused by the discharge or potential discharge; the method will provide early warning of a potential violation of ground water protection levels or class TDS limits and meets or exceeds the requirements for vadose zone or leak detection monitoring.

Monitoring well construction and ground water sampling should conform to A Guide to the Selection of Materials for Monitoring Well Construction. Sample collection and preservation, should conform to the EPA RCRA Technical Enforcement Guidance Document, OSWER-9950.1, September, 1986. Sample analysis must be performed by State-certified laboratories by methods outlined in UAC R317-6-6.3L. Analytical methods used should have minimum detection levels which meet or are less than both the ground water quality standards and the anticipated protection levels.

11. **Closure and Post Closure Plan:** The purpose of this plan is to prevent ground water contamination after cessation of the discharge or potential discharge and to monitor the discharge or potential discharge point after closure, as necessary. This plan has to include discussion on: liquids or products, soils and sludges; remediation process; the monitoring of the discharge or potential discharge point(s) after closure of the activity.

12. **Contingency and Corrective Action Plans:** The purpose of this Contingency plan is to outline definitive actions to bring a discharge or potential discharge facility into compliance with the regulations or the permit, should a violation occur. This applies to both new and existing facilities. For existing facilities that may have caused any violations of the Ground Water Quality Standards or class TDS limits as a result of discharges prior to the issuance of the permit, a plan to correct or remedy any contaminated ground water must be included.

    Contingency Plan – This plan should address: cessation of discharge until the cause of the violation can be repaired or corrected; facility remediation to correct the discharge or violation.

    Corrective Action Plan – for existing facilities that have already violated Ground Water Quality Standards, this plan should include: a characterization of contaminated ground water; facility remediation proposed or ongoing including timetable for work completion; ground water remediation.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Rick Torgerson, UDOT Region 4 Director	(435) 201-1844
NAME & OFFICIAL TITLE (type or print)	PHONE NO. (area code & no.)
Rick J. Torgerson Digitally signed by Rick J. Torgerson Date: 2017.12.04 08:44:46 -07'00'	12/04/17
SIGNATURE	DATE SIGNED

Ground Water Discharge Permit Application for I-70 Bridge Deck Hydro-demolition

PIN: 13804
F-I70-1(90)7

UDOT Region 4
Richfield, Utah

November 2017

1 Introduction

1.1 Site Location and Description

This document has been prepared in support of the Ground Water Discharge Permit Application for the evaporation pond proposed for the UDOT I-70 Bridge Preservation Project that will use hydro-demolition operations for the concrete removal of 14 bridge decks along I-70 from Mile Post 7 to Mile Post 21. The evaporation pond is proposed to be located in between the cities of Joseph and Sevier on I-70 at approximately Mile Post 24.4. A location map is provided in the Appendix. The proposed evaporation pond will be located on land owned by the Utah Department of Transportation (UDOT) and the construction will be completed in accordance with plans and specifications prepared for UDOT Region 4. The physical address of UDOT Region 4 is 210 West 800 South, Richfield, UT 84701.

Hydro-demolition is a concrete removal technique which utilizes high-pressure water to remove deteriorated and sound concrete. Unlike jackhammers, hydro-demolition does not produce vibrations through a structure and therefore does not produce micro fractures. For this reason, hydro-demolition was chosen for the replacement of concrete bridge decks along Interstate 70.

The evaporation pond capacity will be 12.8 acre feet and will accept approximately nine (9) million gallons of waste water from the hydro-demolition locations from 2017 to 2018. The pond was designed to be eight (8) feet deep with two (2) feet of freeboard. See design plans in the Appendix. Waste water deposited into this pond will be generated from the bridge locations and contain a high concentration of solids and high pH. The water will be treated off-site with a flocculent to settle the large particles of concrete and solids, as well as an acid (e.g. citric acid) to neutralize the pH. After transfer of the treated waste water to the pond site, the water will be dumped in the pond and allowed to evaporate leaving sludge and solids behind to be disposed of at a landfill.

1.2 Surrounding Land Use

The pond location is bordered by Interstate 70 to the west, Sevier Highway to the east, and private properties to the north and south. The Paiute Indian Tribe owns land west of Interstate 70 which is not developed. The area directly north of the pond location is sparsely developed with two or three houses. On the east and south sides of Sevier Highway, farmlands exist between the highway and the Sevier River.

2 Site Soils and Geology

2.1 Site Soils

Soils in the area of the pond include the Annabella cobbly sandy loam and the Hundraw-Rock outcrop complex. Both soils exist with 5 to 60 percent slopes.

2.2 Site Geology

Consolidated rocks exposed in the mountains surrounding the central Sevier valley range in age from Jurassic to Pleistocene. Thick sequences of primarily marine sediments were deposited east of the Sevier orgenic belt from Jurassic through Cretaceous time, with a hiatus in deposition between the Jurassic and Cretaceous. During this time, a broad arch developed in western Utah

and the basis to the east was down-warped and filled with evaporite deposits, fine-grained clastic rocks, carbonate rocks, and sandstone. Prior to deposition of Tertiary rocks, the Jurassic and Cretaceous rocks were deformed during the early Laramide orogeny. The post-early Laramide sequence, therefore, general overlies with an angular unconformity, folded Jurassic and Cretaceous rocks. This sequence consists of predominantly clastic marine and continental deposits that include thick units of limestone and volcanic rocks. These rocks vary in thickness with location and might have unconformable surfaces between formations.

The Sevier-Sigurd basin extends from the mouth of Marysvale Canyon in the south, located approximately 10 miles from evaporation pond site, to a constriction in the valley at Rock Ford Reservoir just north of Sigurd. This constriction is formed by Tertiary volcanic rocks on the east and by an uplifted block of Tertiary sedimentary rocks covered with alluvium on the west. In the southwest, a small subbasin is formed by a constriction of Tertiary volcanic rocks northeast of Joseph. A geologic map is included in the Appendix.

Geologic map for the site show that it is classified as Qa2 which is defined as Alluvial Valley Deposits. This is unconsolidated clay, silt, sand and gravel recently deposited parallel to localized stream valleys and/or spread more regionally onto alluvial flats of larger river valleys; sandy sediment generally more dominant than gravelly sediment.

3 Site Hydrology

3.1 Surface Water Hydrology

Flow in the Sevier River through the Sevier-Sigurd basin is dependent on the quantity of water released upstream from Piute Reservoir, inflow from several tributary streams, diversions to canals, surface return flow from irrigation, and seepage to and from the ground water system. The surface water system of the Sevier-Sigurd basin is very complex, with surface return flow to and seepage from the ground water system; these two components are the most difficult to determine.

Surface water flows onto the UDOT property from a box culvert under Interstate 70 located on the northwest side of the evaporation pond site. Water from the box culvert flows across the UDOT property and north of the proposed pond location and eventually flows into the Sevier River. This site has a low potential for flooding in that there are many steep slopes throughout. If flooding were to occur on the site, it would come from the box culvert and move across the site. It is highly unlikely that a flood event from this drainage system would impact the evaporation pond as the proposed pond will be located to the south of an existing roadway. This roadway provides a barrier for any water that may flow across the site and directs the floodwaters to the east.

The elevation of the site is approximately 5576 MSL and the Sevier River is approximately 5473 MSL. There is no risk of flooding of the site from the Sevier River.

3.2 Ground Water Hydrology

The site is located within the Sevier-Sigurd ground water basin according to the Division of Water Rights. The ground water system receives most of its recharge from streams, canals, ditches, and irrigated fields. The principal ground water system in the Sevier-Sigurd basin is in the unconsolidated basin fill where ground water is under unconfined and confined conditions. The ground water system is interconnected with multiple layers consisting mainly of interbedded clay, silt, sand, and gravel. The consolidated rock bounding the basin contains water in some areas. Ground water discharges from the Flagstaff Limestone west of Richfield, and from the Arapien Shale and Tertiary volcanic rocks east of Glenwood. Several municipalities obtain water for public supply from springs issuing from consolidated rock in the adjacent mountains. Consolidated rock, however, generally is either a ground water barrier or localized source of recharge to the ground water system.

In general, ground water in the Sevier-Sigurd basin moves from recharge areas in the south ends and along the western margin of the basin to the northeast, where it discharges from the ground water system. Ground water flow is impeded at the northern basin boundary by thick clay layers and by shallow consolidated rock of low permeability. Shallow consolidated rock and overlying fine-grained deposits also create an impediment to ground water flow at the northern end of the subbasin near Joseph.

As ground water moves from the primary recharge areas of the basin into the confined zones, an upward vertical gradient is established. In these areas, ground water moves upward from the shallow confined zone to the shallow water-table zone where it is discharged to the Sevier River, to drains, and by evapotranspiration. Ground water also moves upward at the contact between basin fill and consolidated rock along the east margin of the basin and is discharged by springs.

Nearby wells are shown on the figure in the following pages.

4 Background Ground Water Quality

There is no specific information for the ground water in this particular location. However, there are numerous reports that have been completed for the Sevier-Sigurd basin aquifer. The location of the site is in Section 22, T25S, R4W. Therefore the wells that will be closest to the site that have been studied are numbered in the (C-25-4) range. There is one well in this range according to the State of Utah Department of Technical Resources Technical Publication No. 103 "*Hydrology of the Sevier-Sigurd Ground-Water Basin and Other Ground-Water Basins, Central Sevier Valley, Utah*". The results of the well testing are provided in the following pages. Total Dissolved Solids were found to be 330 mg/L.

A report can be found on the internet (https://water.utah.gov/planning/swp/Sevier/PDF/swp_sr19.pdf) that states the water in the Sevier-Sigurd basin is good-fair.

5 Agricultural Description

The site for the proposed pond is not used for any agriculture and is not irrigated.

6 Water Flows and Treatment

The line drawing provided in the Appendix shows that approximately 11.6 million gallons will be used as a result of hydro-demolition activities. Assuming that 20% of the water will be released into the atmosphere and/or lost to the concrete during production, approximately 9 million gallons of water will be transferred to the evaporation pond over the course of two years.

Hydro-demolition waste waters typically have pH values ranging between 11 and 12. Water also has suspended solids concentrations of 100 parts per million (ppm) and dissolved concentrations ranging between 550 ppm and 2500 ppm, approximately 5 times the level in drinking water. Hydro-demolition waste waters have been shown to contain sulfates and hydroxides from cement, chlorides from calcium chloride, as well as small quantities of both hydrocarbons and admixture compounds including ethaolamine, diethanolamine, formaldehyde, K-napthalene, sulfonate and benzene sulfonic acid.

Once the hydro-demolition water is captured at the site, the water will be transferred to large tanks where a flocculent will be added to induce settling of large particles. Additionally, an acid such as citric acid will be added to neutralize the pH from a highly basic solution (pH<7) to a neutral solution (pH~7). Once this treatment is completed, the water will be transferred from the tank to a water truck where it will be hauled off of the tank site and transferred to the evaporation pond. The water will be transferred from the truck to the evaporation pond by hoses and allowed to settle and evaporate. The evaporation pond has no discharge point. The addition of flocculent and acid before it reaches the pond site will help mitigate the risk of ground water contamination.

7 Ground water Discharge Plan

The evaporation pond for the I-70 hydro-demolition project will be used for approximately three (3) years. The pond will be constructed with a 6-inch layer of sand and two 60-mil HDPE liners. In between the liners, a geonet fabric will be placed to allow any water that breaks through the upper liner to flow to a sump. The pond and sump will be monitored and inspected daily to monitor conditions and note any issues that may result in an inappropriate discharge. Additionally, a video system will be installed to view the pond and gauges at any time. It is anticipated that with these measures in place and properly maintained, there will be no discharges to ground water throughout the evaporation pond life.

The evaporation pond will be installed with a gauge to measure water levels or level lines on the side of the pond. All trucks depositing water in the pond will keep a record of the water level before dumping, amount of water dumped, and water level after dumping. Each inspection will make a note of the water level and any anomalies in the water level will be investigated and repaired. When the water level gets to within two (2) feet of the elevation of the embankment, the Contractor will begin to make arrangements for the dumping of water into on-site storage tanks or disposal at a waste water treatment plant. When water level gets to within one (1) foot of the elevation of the embankment, no additional waste water will be allowed in the pond, The contractor will pump the pond if necessary and dispose of waste water at a sewage treatment plant or store in tanks on site until pond levels go down.

An analysis of rainfall runoff was conducted and is included in the Appendix. Rainfall intensities were obtained from NOAA Atlas 14 for Sevier, Utah. A 5-year storm in this area

would produce approximately 8.5 inches of rainfall on top of the water surface. Surface ditches will be constructed uphill of the evaporation pond in an attempt to capture all surface water before entering the pond. The 2-foot freeboard of the pond will allow for storage of any surface water in the case of a large storm or failure of the ditches.

The leak collection pit will capture any water that leaks through the upper liner. A SCH 40 polyvinyl chloride (PVC) pipe sump will convey the water to a leak collection sump where water levels can be monitored and a pump can be placed to pump the water out. The leak collection sump is detailed on the plans provided in the Appendix. The pumped water can either be put back into the pond after the breached liner is repaired or discharged to an appropriate waste water facility in accordance with local, state, and federal regulations.

Inspections will be completed daily during pond operation. Pond operation is defined as activities where the pond is being accessed by water trucks. Inspectors will use the inspection form provided in the Appendix. All inspections will include the following information:

- Name of inspector
- Date and time of inspection
- Weather conditions (e.g. sunny, warm, rainy) including temperature and any significant rainfall within the last seven days
- Nature of inspection (routine or repair inspections)
- Condition of liner and location of any breaches in the liner noted on a site plan
- Water level in pond
- Repair actions taken
- Water level in leak collection sump
- Indication of pumping is necessary
- Changes in operation procedures
- Signature of inspector

Inspections will also be completed daily during times of non-operation such as the winter. Inspections may be completed by video and/or closed caption television (CCTV).

Forms will be kept by the contractor for the duration of the project and for five years after the closure of the pond. Forms will also be submitted to UDOT Region IV and the Utah Department of Environmental Quality (DEQ), if necessary, for review. Submittals to DEQ will be in

8 Post-Closure Land Use

The post-closure land use of the property will be returned to its existing use as a storage facility for UDOT materials. There are no plans for re-development of the site after closure of the pond.

9 Potential for Site Remediation

It is not anticipated that remediation of the ground water and surface water will need to be completed due to the use of this property for an evaporation pond. Soil sampling may be required if there are significant discharges of hydro-demoliton waste water during impoundment. DEQ will determine what a significant discharge is. A soil sampling plan will be determined by UDOT and DEQ at the time of pond closure.

10 Closure Plan Components

At closure, all water will be evaporated from the pond and the liner and compliance monitoring equipment removed to allow the pond area to be re-graded and vegetated.

10.1 Water Evaporation

As part of the evaporation pond closure operations, treated waste water will cease to be discharged to the pond. Any water remaining in the pond will be allowed to evaporate. Any sludge remaining in the pond after removal of the water will be dewatered, if necessary, with the effluent going to a sewage treatment plant and the solids disposed of at an approved landfill facility.

The waste water that goes to the evaporation ponds is non-hazardous, so the solids should also be non-hazardous, but the material will be analyzed if required. It is anticipated that the remaining bottom solids will be removed along with the pond liners, as discussed in the next section.

10.2 Liner Removal

The ponds will be constructed with two layers of 60 mil HDPE liners, a geonet layer, an electronic monitoring system, and leak collection recovery system (LCRS). The upper liner will be removed first and disposed of at a landfill. Then the geonet layer removed and finally, the lower liner and the LCRS will be removed and hauled to the landfill for disposal.

10.3 Site Grading

After the liners and associated infrastructure is removed from the pond, the berm will be removed and the area returned to its original contours with native soil. Final grade will be attained by grading the surrounding soils from the area immediately adjacent to the pond where possible. Additional material for fill will be excavated from specific areas designated by the owner. There is sufficient fill material on site to complete the final grading so no import of fill is anticipated.

10.4 Site Drainage

No drainage structures will be required at closure based on the grading. The final grade will match the existing grade, consistent with the surrounding contours and natural drainage pattern of the site.

10.5 Revegetation

Areas impacted by grading and other disturbances during closure operations will be revegetated. The revegetation is intended to reduce impacts to surface water by establishing a self-sustaining native plant community which will provide protection against soil erosion and enhance the natural aesthetics of the closed site. The need for soil amendments will be determined based upon site-specific evaluations at the time of closure. The application of mulch and fertilizer will be determined by the owner at the time of planting. Planting will be performed between May and September.

Amended areas will be seeded with a mixture of native grasses that will not depend on the external application of water or fertilizer. The plat species native to the area, as listed in the

NRCS *Soil Survey of Sevier County, Utah* are: Alkali Sacaton, Wyoming Big Sagebrush, Utah Juniper-Bluebunch Wheatgrass, and Black Greasewood. Specific species, composition percentages, and seeding rate will be determined during a vegetation survey conducted as part of the closure operations.

10.8 Regulatory Compliance

A stormwater discharge permit (UPDES) will be required for construction activities during site closure, and must be obtained prior to implementing the closure operations. Temporary erosion control measures such as silt fence, wattles, or mulch socks will be placed around the construction zone during construction but can be removed upon completion of the site closure and revegetation in accordance with the UPDES permit. Dust will be controlled periodically during earthmoving operations by watering haul roads and other dust generating areas, as necessary.

11 Closure Operations and Schedule

Although a specific schedule of operations will be prepared by the construction contractor selected to perform the closure, a general schedule follows.

Week 1:

- Notify UDOT that closure operations will commence.
- Notify DWQ that the evaporation pond will be permanently closed.
- Cease waste water delivery to the evaporation ponds.
- Prepare Storm Water Pollution Prevention Plan (SWPPP)

Weeks 1-4:

- Evaporate water from ponds.
- Mobilize construction equipment.
- Install sediment controls.
- Dewater and dispose of sludge.

Weeks 5-9:

- Remove and dispose of upper liners.
- Remove and dispose of PVC leak collection pipes, filter fabric, and gravel.
- Remove and dispose of lower liners.
- Fill and regrade ponds.
- Perform vegetation survey and soil analysis for amendments and seed mix.
- Final grade area.

Week 10 (during May to September of season)

- Revegetate site.

12 Contingency and Corrective Action Plan

The Contingency Plan describes response actions which will be undertaken if an out of compliance status occurs at the evaporation pond site. An out of compliance situation is when any pond water is allowed to infiltrate into the soil, either underneath or outside the pond.

In the event that there is waste water outside of the pond and infiltrating in the ground, a breach in the pond, or the liners resulting in a discharge, the following steps will be taken:

- UDOT shall take reasonable and practical interim measures to stop the source and minimize the spread of any contaminants. These measures may include:
    - Stopping the dumping of water in the pond and immediate repair of the liner that is ripped, torn, or punctured or of any area that is causing the leak. A leak test will be performed after all repairs are made to ensure that there are no more leaks.
    - Installing piezometers.
    - Using existing or installing ground water wells within the area to detect contamination.
    - Using another form of water treatment for the hydro-demolition operations.
- UDOT shall immediately notify the Utah Department of Environmental Quality.
- UDOT shall investigate the source, nature, extent, and potential dispersion of contaminants.
- UDOT will submit a Source Assessment and Compliance Schedule in accordance with the requirements of the ground water discharge permit.

The DEQ Executive Secretary shall evaluate the effectiveness of all Source Assessment and Compliance Schedule measures. If the Executive Secretary determines that these efforts are not effectively addressing detected and or potential ground water contamination, UDOT shall be notified and requested to submit a Source Contamination Investigation Plan. The Contaminant Investigation will conform to the requirements of UCA R317-6-6.15 D and may include an endangerment assessment. The endangerment assessment will be completed in the event that Alternate Corrective Action Concentration Limits or other standards are proposed.

The endangerment assessment will consider potential human and ecological receptors in evaluating potential adverse effects of the release. More specifically, the endangerment assessment will address:

- Potential routes of exposure and contaminant concentrations
- Potential effects of the contaminant on humans (e.g. toxicity)
- Human populations at risk
- Potential or actual adverse effects on affected plants, animals, ecosystems, and other natural resources
- Potential or actual adverse effects on future uses of ground water.

The endangerment assessment will take into consideration any down-gradient water users and supply wells with a two mile radius down and cross-gradient of the facility.

12.1 Corrective Action Plan

If the Contamination Investigation identifies a potential risk that requires ground water remediation, UDOT will conduct a feasibility evaluation to examine the various options available for a formal Corrective Action Plan. The feasibility evaluation may include:

- Evaluating passive management or monitoring to assess whether natural process reduce the contamination to levels below the permitted levels.
- Assessing the feasibility and effectiveness of extracting and treating ground water using well or drains.
- Examining the feasibility and effectiveness of isolating the contaminated ground water by slurry walls, grout curtains, sheet piles, and/or capping.
- Evaluating in-situ chemical neutralization options.
- Petitioning the Water Quality Board for an Alternate Corrective Action Concentration Limits consistent with the potential risks identified.

Corrective Action Plans will be written in accordance with UCA R317-6-6.15 D and submitted for approval to the Division of Water Quality upon completion of the Contaminant Investigation.

Sources

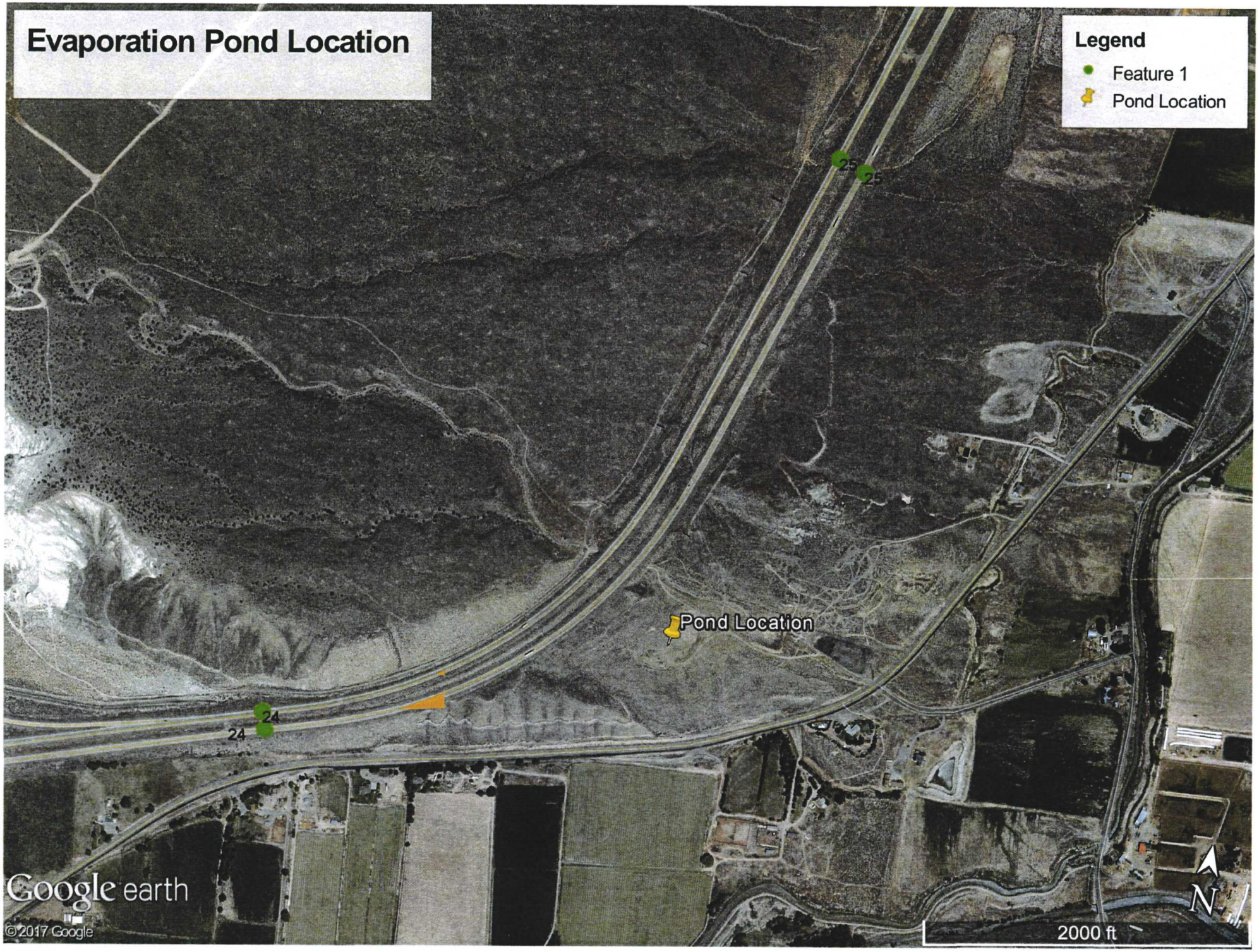
Ground-Water Conditions and Storage in the Central Sevier Valley, Utah, Geological Survey Water-Supply Paper 1787

Hydrology of the Sevier-Sigurd Ground-Water Basin and Other Ground-Water Basins, Central Sevier Valley, Utah, State of Utah Department of Technical Resources Technical Publication No. 103

Appendix Contents

A. Location Map
B. Topographic Map
C. Geologic Map
D. Plat Map
E. Well Sampling Results
F. Nearby Well Locations
G. Well Logs
H. Line Drawing
I. Sample Inspection Form
J. Design Plans and Specifications

APPENDIX A: LOCATION MAP


Evaporation Pond Location
Legend
Feature 1
Pond Location
25
25
Pond Location
24
24
Google earth
© 2017 Google
2000 ft
N

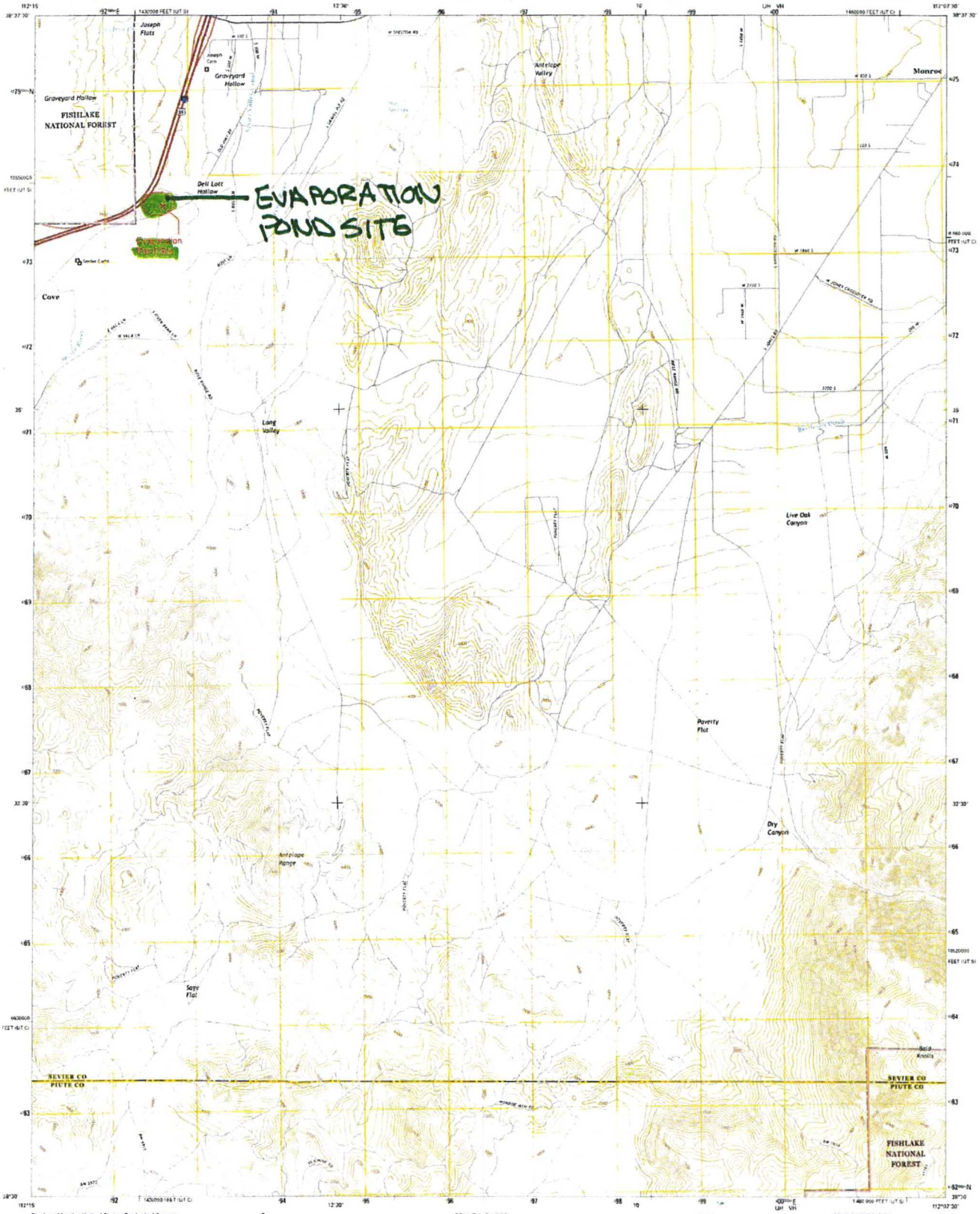
APPENDIX B: TOPOGRAPHIC MAP

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

ANTELOPE RANGE QUADRANGLE
UTAH
7.5-MINUTE SERIES



Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 12S
10 000-meter grid: Utah Coordinate System of 1983 (central and south zones)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Roads ..... U.S. Census Bureau, 2015 2016
Roads within US Forest Service lands ..... FSTopo Data with limited Forest Service updates, 2012 - 2016
Names ..... GNIS 2016
Hydrography ..... National Hydrography Dataset 2014
Contours ..... National Elevation Dataset 2000
Boundaries ..... Multiple sources; see metadata file 1972 - 2016
Public Land Survey System ..... BLM 2016
Wetlands ..... FWS National Wetlands Inventory 1972 - 2014

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.19

1	2	3
4		5
6	7	8

1 Joseph Pass
2 Elsinore
3 Annabella
4 Marysvale Canyon
5 Monroe Peak
6 Mount Belknap
7 Marysvale
8 Marysvale Peak

ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route
FS Primary Route — FS Passenger Route — FS High Clearance Route

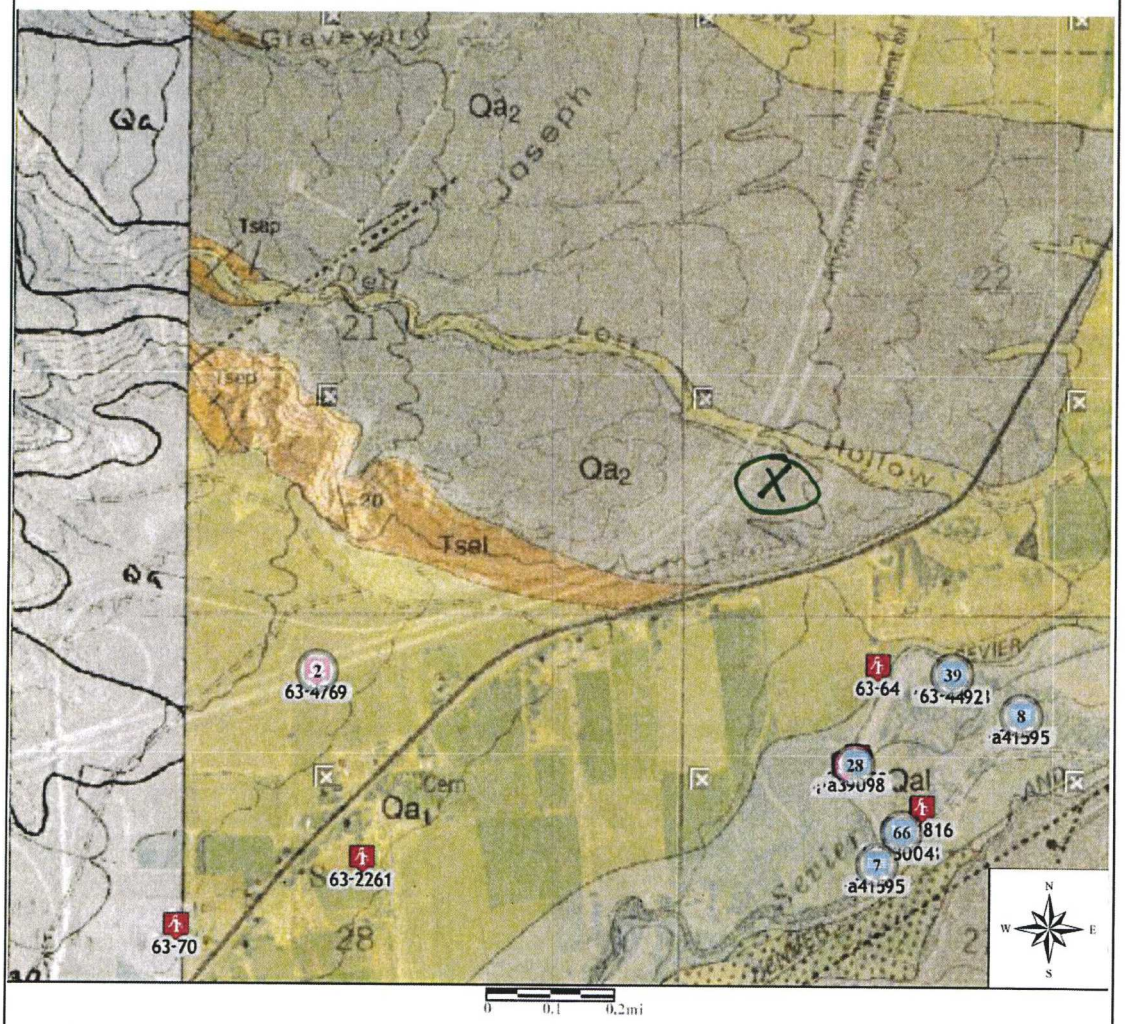
Check with local Forest Service unit for current travel conditions and restrictions.

ANTELOPE RANGE, UT
2017

APPENDIX C: GEOLOGIC MAP

GEOLOGIC MAP

Water Rights Map



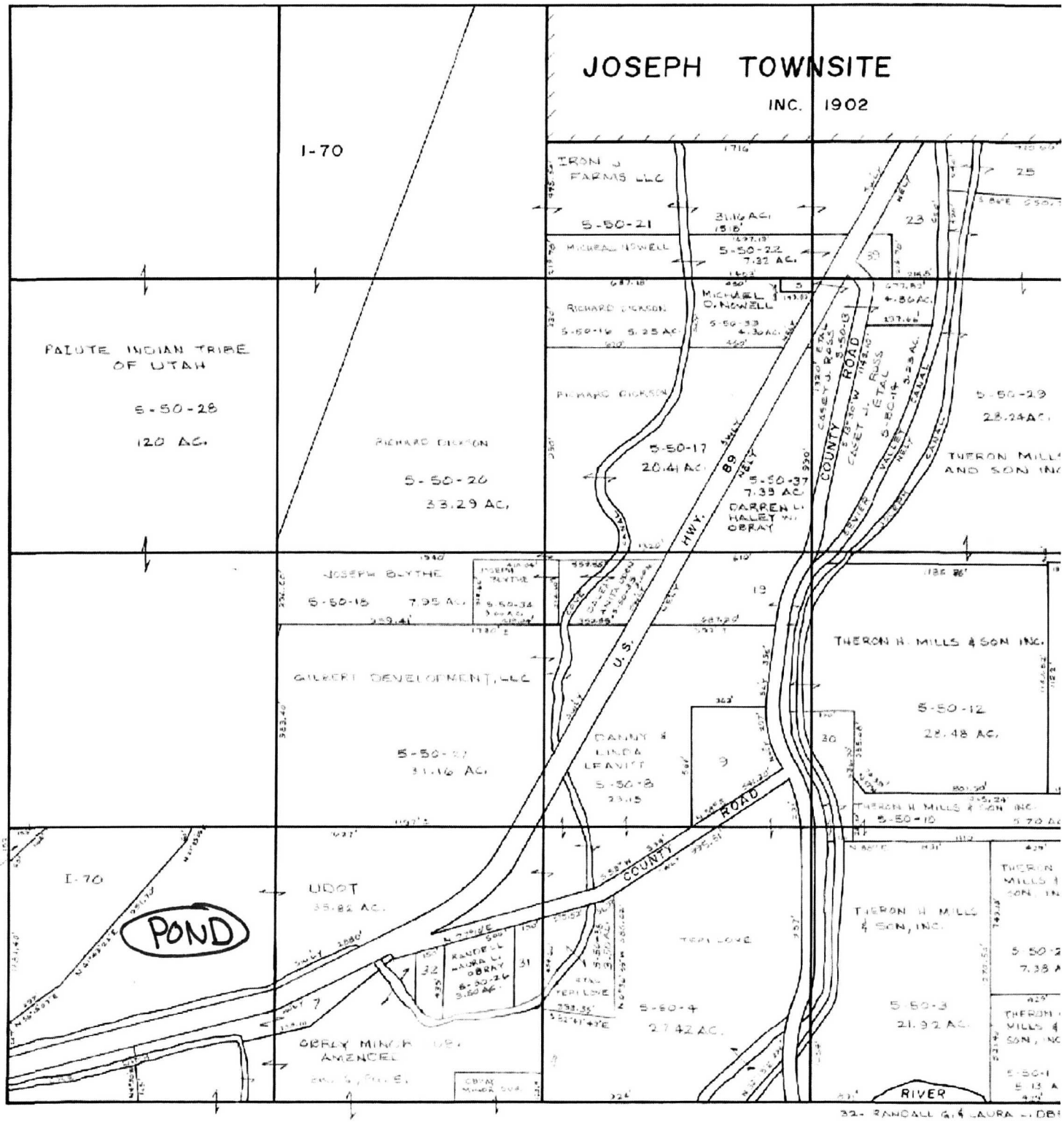
X EVAPORATION POND SITE

APPENDIX D: PLAT MAP

BOOK 5

SEVIER COUNTY

SECTION 22 , T 25 S, R 4 W, S.L.B.& M.



REVISIONS	INITIAL AND DATE					NOTES	U.S.T.C. approval Date:	PLAT DEPARTMENT SEVIER COUNTY, UTAH	Section 22 T 25 R 4
									drawn by: DD date:

APPENDIX E: WELL SAMPLING RESULTS

Table 26. Chemical analyses of water from selected wells—Continued

Location	Date measured	Specific conductance (µS/cm)	pH (standard units)	Temperature, water (°C)	Hardness, total (mg/L as $CaCO_3$)	Hardness, noncarbonate (mg/L as $CaCO_3$)	Alkalinity, field (mg/L as $CaCO_3$)	Solids, dissolved (mg/L)	Calcium, dissolved (mg/L as Ca)	Magnesium, dissolved (mg/L as Mg)
(C-24-3)27bca-1	06-07-89	880	7.1	12.0	360	0	377	526	91	31
(C-24-3)34cdb-1	06-30-89	750	7.2	11.5	310	0	296	460	89	20
(C-25-3) 5cba-1	06-27-89	740	7.3	13.5	290	0	290	433	82	21
(C-25-3)16bdc-1	06-15-89	450	7.2	11.5	180	10	172	267	53	12
(C-25-3)29cac-1	06-27-89	500	7.5	15.0	220	31	197	306	70	12
(C-25-4)13bdb-1	05-25-89	500	7.7	—	190	0	220	330	51	15
(C-27-3)18dbd-1	06-08-89	3,310	7.0	11.0	1,300	1,000	348	1,620	460	44
(C-27-3)18dab-1	06-08-89	210	7.2	8.5	90	8	81	132	31	3.1
(C-27-3)33cdc-1	06-14-89	410	7.7	11.5	190	86	116	302	63	8.6
(C-28-3) 6dbc-2	06-08-89	350	7.8	11.5	170	42	132	199	46	14
(C-28-3)21ada-1	06-14-89	610	7.6	13.5	280	120	170	368	90	14
(C-28-3)34cdc-1	06-14-89	350	8.8	15.0	14	0	120	211	5.3	0.13
(D-18-1)30bcd-1	10-15-87	1,600	7.6	15.0	360	15	345 L	904	50	57
(D-19-1)23dba-1	06-13-89	2,480	7.2	15.5	590	270	322	1,500	110	75
(D-21-1)31cba-1	08-08-89	3,750	7.6	15.5	740	400	371	2,410	160	81

Sodium, dissolved (mg/L as Na)	Potassium, dissolved (mg/L as K)	Bicarbonate, field (mg/L as HCO_3)	Sulfate, dissolved (mg/L as SO_4)	Chloride, dissolved (mg/L as Cl)	Fluoride, dissolved (mg/L as F)	Bromide, dissolved (mg/L as Br)	Silica, dissolved (mg/L as SiO_2)	Boron, dissolved (µg/L as B)	Iron, dissolved (µg/L as Fe)	Lithium, dissolved (µg/L as Li)	Manganese, dissolved (µg/L as Mn)	Strontium, dissolved (µg/L as Sr)
54	4.3	—	55	27	0.40	0.07	35	160	7	44	<1	660
41	3.9	361	53	27	0.30	0.09	30	90	13	19	2	510
40	3.4	354	48	29	0.40	0.09	33	110	5	34	1	620
23	1.5	210	40	8.7	0.30	0.04	25	50	8	6	1	380
18	1.8	240	53	6.2	0.40	0.04	28	40	3	8	<1	550
43	5.7	268	31	19	0.50	0.06	33	110	27	48	1	1,300
31	6.0	424	53	810	0.30	0.10	32	90	80	30	10	3,300
7.7	0.80	99	14	4.6	0.60	<0.01	20	10	5	<4	<1	210
18	3.1	142	88	13	0.30	0.04	43	50	12	13	<1	540
4.8	0.80	161	40	2.3	0.30	<0.01	12	10	10	8	<1	320
16	0.90	208	110	18	0.20	0.07	18	50	4	16	<1	1,000
73	0.40	130	24	16	1.3	0.08	19	210	170	9	3	51
200	3.0	—	91	270	0.30	0.16	23	150	—	78	—	—
310	4.2	393	350	430	0.60	0.19	19	280	20	90	<10	5,000
530	7.0	453	860	540	0.80	0.39	26	570	70	110	160	3,700

APPENDIX F: NEARBY WELL LOCATIONS

NEARBY WELL LOCATIONS

Water Rights Map

APPENDIX G: WELL LOGS

Form 113—5M—12-60

Examined JAN 11 1980 XM

Recorded: B. C. ..... T. B. .....

Inspection Sheet .....

Copied .....

63-2301

REPORT OF WELL DRILLER

STATE OF UTAH

Application No. 52651

Claim No. .....

Coordinate No. .....

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:

Name Wayne Mills

Address Joseph Utah

(2) LOCATION OF WELL:

County Sevier Ground Water Basin (leave blank)

North/~~South~~ 300 feet, ~~East~~/West 1120 feet from SE Corner

of Section 22, T. 25 N/S, R. 4 E/W ~~UBM~~ SLBM (strike out words not needed)

(3) NATURE OF WORK (check):

New Well ☒ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐

If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):

Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☒

Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):

Rotary ☒ Dug ☐ Jetted ☐

Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE:

Threaded ☐ Welded ☒

6" Diam. from 0 feet to 100 feet Gage .250

..." Diam. from ..... feet to ..... feet Gage .....

..." Diam. from ..... feet to ..... feet Gage .....

New ☒ Reject ☐ Used ☐

(7) PERFORATIONS:

Perforated? Yes ☐ No ☒

Type of perforator used .....

Size of perforations ..... inches by ..... inches

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

(12) WELL TESTS:

Drawdown is the distance in feet the water level is lowered below static level.

Was a pump test made? Yes ☐ No ☒ If so, by whom? .....

Yield: ..... gal./min. with ..... feet drawdown after ..... hours

" " " " " "

" " " " " "

Bailer test ..... gal./min. with ..... feet drawdown after ..... hours

Artesian flow ..... g.p.m. Date .....

Temperature of water 50° Was a chemical analysis made? No ☐ Yes ☒

(13) WELL LOG:

Diameter of well 6 inches

Depth drilled 100 feet. Depth of completed well 100 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH		MATERIAL										REMARKS
From	To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	
0	2		X									
2	23				X							
23	95	X			X							
95	100				X							

Form 113—5M—12-60

Examined JUL 23 1981 JUL 23 1981 DW.

Recorded: B. C. ..... T. B. .....

Inspection Sheet .....

Copied .....

REPORT OF WELL DRILLER

STATE OF UTAH

Application No. 55465

Claim No. .....

Coordinate No. 63-2407 (C25S-4W)23cba

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:

Name Eugene Mills

Address Joseph Utah

(2) LOCATION OF WELL:

County Sevier Ground Water Basin ..... (leave blank)

North 2178 feet, South West 1225 feet from SW Corner of Section 23, T. 25 N S, R. 4 E W SLBM (strike out words not needed)

(3) NATURE OF WORK (check):

New Well ☑ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐

If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):

Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☐

Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):

Rotary ☑ Dug ☐ Jetted ☐

Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE:

Threaded ☐ Welded ☑

6" Diam. from 0 feet to 100 feet Gage .250

..... " Diam. from ..... feet to ..... feet Gage .....

..... " Diam. from ..... feet to ..... feet Gage .....

New ☑ Reject ☐ Used ☐

(7) PERFORATIONS:

Perforated? Yes ☐ No ☑

Type of perforator used .....

Size of perforations ..... inches by ..... inches

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

(12) WELL TESTS:

Drawdown is the distance in feet the water level is lowered below static level.

Was a pump test made? Yes ☐ No ☑ If so, by whom? .....

Yield: ..... gal./min. with ..... feet drawdown after ..... hours

" ..... " ..... " ..... "

" ..... " ..... " ..... "

Bailer test ..... gal./min. with ..... feet drawdown after ..... hours

Artesian flow ..... g.p.m. Date .....

Temperature of water 52° Was a chemical analysis made? No ☑ Yes ☐

(13) WELL LOG:

Diameter of well 6 inches

Depth drilled 100 feet. Depth of completed well 100 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH		MATERIAL										
From	To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	5		X									
5	40		X		X							
40	50	X			X							
50	100	X	X		X							

63-1816

Form 113—5M—12-60

Examined 6/22/73

Recorded: B. C. 6/23/73 T. B.

Inspection Sheet

Copied 7-16-73 BM

REPORT OF WELL DRILLER

STATE OF UTAH

Application No. 409 79

Claim No.

Coordinate No. (C-25-4) 27adb

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Utah. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file such reports constitutes a misdemeanor.)

(1) WELL OWNER:

Name Rock Abbot #

Address 2440 Shadeland Drive

~~Newhall Calif.~~

(2) LOCATION OF WELL:

County Sevier Ground Water Basin (leave blank)

~~North~~ South 1820 feet, ~~East~~ West 845 feet from NW Corner

of Section 1, T. 24 ~~N~~ S, R 3 ~~E~~ W SLBM ~~USM~~ (strike out words not needed)

(3) NATURE OF WORK (check):

New Well ☒ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐

If abandonment, describe material and procedure:

(4) NATURE OF USE (check):

Domestic ☒ Industrial ☐ Municipal ☐ Stockwater ☐

Irrigation ☐ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):

Rotary ☐ Dug ☐ Jetted ☐

Cable ☒ Driven ☐ Bored ☐

(6) CASING SCHEDULE:

Threaded ☒ Welded ☐

4" Diam. from 0 feet to 160 feet Gage STD

" Diam. from feet to feet Gage

" Diam. from feet to feet Gage

New ☒ Reject ☐ Used ☐

(7) PERFORATIONS:

Perforated? Yes ☐ No ☒

Type of perforator used

Size of perforations inches by inches

perforations from feet to feet

perforations from feet to feet

perforations from feet to feet

perforations from feet to feet

perforations from feet to

(12) WELL TESTS:

Drawdown is the distance in feet the water level is lowered below static level.

Was a pump test made? Yes ☐ No ☐ If so, by whom?

Yield: gal./min. with feet drawdown after hours

" " " " "

" " " " "

Bailer test 8 gal./min. with 30 feet drawdown after 2 hours

Artesian flow g.p.m. Date

Temperature of water 52° Was a chemical analysis made? No ☐ Yes ☒

(13) WELL LOG:

Diameter of well 4 inches

Depth drilled 160 feet. Depth of completed well 130 feet.

NOTE: Place an "X" in the space or combination of spaces needed to designate the material or combination of materials encountered in each depth interval. Under REMARKS make any desirable notes as to occurrence of water and the color, size, nature, etc., of material encountered in each depth interval. Use additional sheet if needed.

DEPTH From	DEPTH To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	REMARKS
0	2		X								X	loam
2	15	X	X	X	X							
15	21		X	X	X							
21	23				X							
23	26	X			X							
26	29		X	X								
29	130	X			X							brown, gravel streaks
130	160	X										no water, grey

Form 113—5M—12-60

Examined FEB 28 1979 AM

Recorded: B. C. ..... T. B. AM

Inspection Sheet .....

Copied .....

63-2229

REPORT OF WELL DRILLER

STATE OF UTAH

Application No. 50938

Claim No. .....

Coordinate No. (c-25-4) 22 db

GENERAL STATEMENT: Report of well driller is hereby made and filed with the State Engineer, in accordance with the laws of Ut (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of the well. Failure to file su reports constitutes a misdemeanor.)

(1) WELL OWNER:

Name Harold Lewis

Address Richfield Utah

TITLE CHANGE SEE ABSTRACT

(2) LOCATION OF WELL:

County Sevier Ground Water Basin ..... (leave blank)

North / South 1000 feet, East / West 155 feet from E ¼ Corner

of Section 22, T. 25 N / S, R. 4 E / W SLBM (strike out words not needed)

(3) NATURE OF WORK (check):

New Well ☑ Replacement Well ☐ Deepening ☐ Repair ☐ Abandon ☐

If abandonment, describe material and procedure: .....

(4) NATURE OF USE (check):

Domestic ☑ Industrial ☐ Municipal ☐ Stockwater ☑

Irrigation ☑ Mining ☐ Other ☐ Test Well ☐

(5) TYPE OF CONSTRUCTION (check):

Rotary ☑ Dug ☐ Jetted ☐

Cable ☐ Driven ☐ Bored ☐

(6) CASING SCHEDULE:

Threaded ☐ Welded ☑

6" Diam. from 0 feet to 112 feet Gage .250

..." Diam. from ..... feet to ..... feet Gage .....

..." Diam. from ..... feet to ..... feet Gage .....

New ☑ Reject ☐ Used ☐

(7) PERFORATIONS:

Perforated? Yes ☐ No ☑

Type of perforator used .....

Size of perforations ..... inches by ..... inches

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

..... perforations from ..... feet to ..... feet

(12) WELL TESTS:

Drawdown is the distance in feet the water level is l ered below static level.

Was a pump test made? Yes ☐ No ☑ If so, by whom? .....

Yield: ..... gal./min. with ..... feet drawdown after ..... ho

" ..... " ..... " .....

" ..... " ..... " .....

Bailer test ..... gal./min. with ..... feet drawdown after ..... ho

Artesian flow ..... g.p.m. Date .....

Temperature of water ..... Was a chemical analysis made? No ☐ Yes

(13) WELL LOG:

Diameter of well 6 inc

Depth drilled 112 feet. Depth of completed well 112 f

NOTE: Place an "X" in the space or combination of spaces needed to designate the mate or combination of materials encountered in each depth interval. Under REMARKS make desirable notes as to occurrence of water and the color, size, nature, etc., of material countered in each depth interval. Use additional sheet if needed.

DEPTH		MATERIAL										REMARKS
From	To	Clay	Silt	Sand	Gravel	Cobbles	Boulders	Hardpan	Conglomerate	Bedrock	Other	
0	21	X	X									
21	24						X					
24	105	X			X							
105	112				X							

Listed on well record
Listed by counties
Copied 8-16-39
Exam. & returned MCB
Exam. for filing
Final Copy checked 8-16-39 C.H.
Platted & No. Assigned
Indexed MG 3-28-41
Engr. tied well
Engr. set Stk.
Well No.

PAGE.....
(Leave Blank)

Report No. 345
Filed ....., 193...
Rec. By.....
Rec. $1.00 Fee.....

Report of Well and Tunnel Driller
STATE OF UTAH

(Separate report shall be filed for each well or tunnel)

GENERAL INFORMATION:

Report of well or tunnel driller is hereby made and filed with the State Engineer, together with a filing fee of $1.00, submitted in accordance with Sections 100-3-22 and 100-2-14, Revised Statutes of Utah 1933, as amended by Session Laws of 1935. (This report shall be filed with the State Engineer within 30 days after the completion or abandonment of well or tunnel. Failure to file such report constitutes a misdemeanor.)

1. Name and address of person, ~~company or corporation boring or~~ drilling well ~~or tunnel~~
(Strike words not needed)
E. W. Anderson North Las Vegas Nev

2. Name and address of owner of well ~~or tunnel~~ Orin P. Ferguson
(Strike words not needed)
Joseph Utah

3. Source of supply is in Sevier County;
..... drainage area; ..... artesian basin
(Leave blank) (Leave blank)

4. The number of approved application to appropriate water is A-13499

5. Location of well ~~or tunnel~~ is situated at a point Appx 3 mi South of Joseph just over Hilton Hwy and first road to right
S. 428 ft. & W. 1048 ft from the N ¼ cor.
Sec. 27 T. 25 S. R. 4 W. SLB&M
(Describe by course and distance with reference to U. S. Government Survey Corner — copy description from well owners' approved application)

6. Date on which work on well ~~or tunnel~~ was begun Oct 16 1936
(Strike words not needed)

7. Date on which work on well ~~or tunnel~~ was completed ~~or abandoned~~ Oct 30 - 1936
(Strike words not needed)

8. Maximum quantity of water ~~flowing~~, pumped ~~or bailed~~ on completion of well ~~or tunnel~~ in
(Strike words not needed)
sec. ft.....; or in gals. per minute 5; Date Jan 14 1937

DETAIL OF COLLECTING WORKS:

WL1

WELL DRILLER'S REPORT

Jones

State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

RECEIVED
SEP 24 1999
WATER RIGHTS
SALT LAKE

Well Identification

CHANGE APPLICATION: a23580(63-4288)

Owner *Note any changes*

Wells Irrigation Company

Joseph, UT 84739

Contact Person/Engineer: Mike Jones

Well Location *Note any changes*

COUNTY: Sevier
NORTH 930 feet WEST 1680 feet from the S4 Corner of
SECTION 23, TOWNSHIP 25S, RANGE 4W, SLB&M.

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)
~~1 mile SE of Joseph~~

Drillers Activity Start Date: 8/29/99 Completion Date: 8/29/99

Check all that apply:
☑ New ☐ Repair ☐ Deepen ☐ Abandon ☐ Replace ☐ Public Nature of Use:

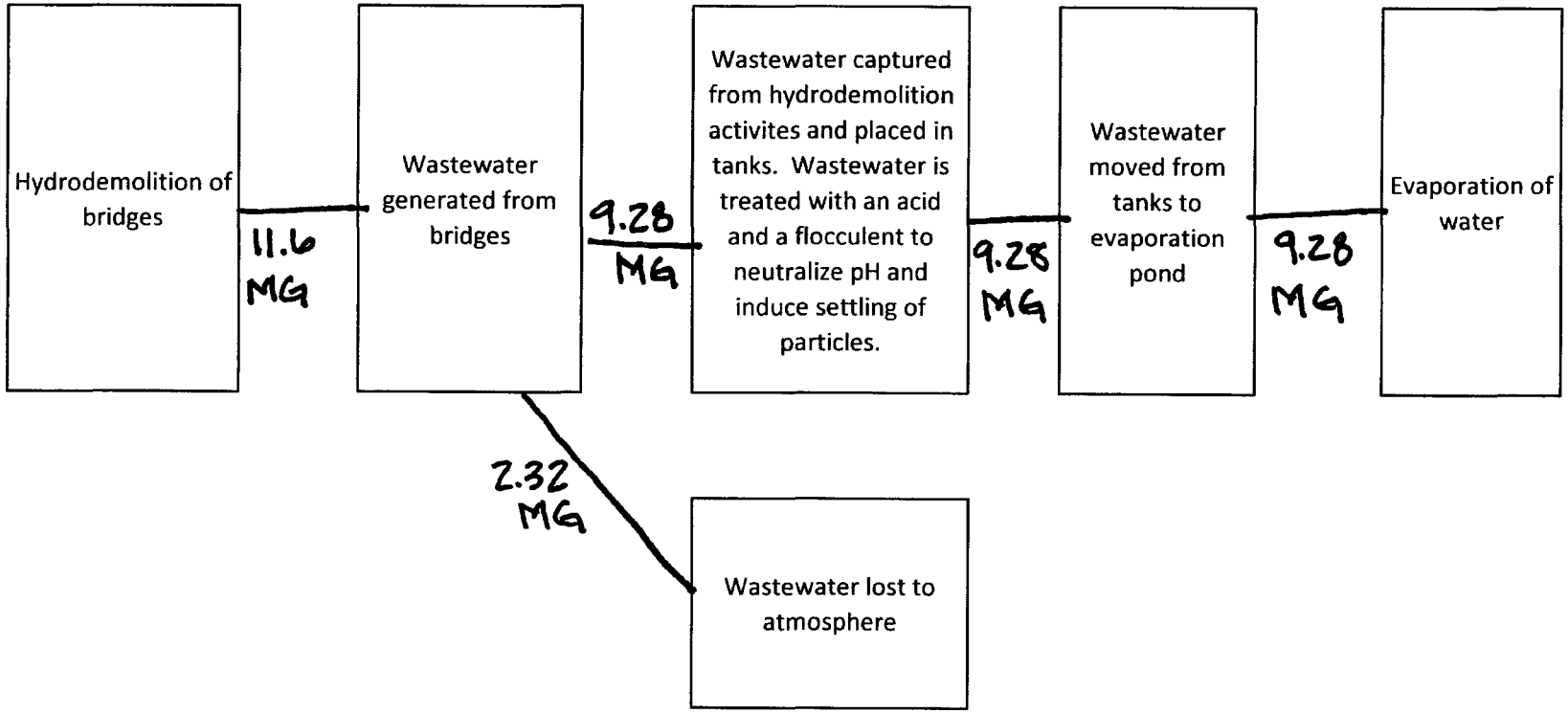
DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	100	8	Mud Rotary	

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE high	PERMEABLE low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTIONS AND REMARKS (include comments on *water quality* if known.)
0	18					X				X				
18	100	X	X					X						

APPENDIX H: LINE DRAWING

LINE DRAWING



CONSTANT ACTIVITIES WILL PRODUCE 25,780 GALLONS/DAY (GPD) OVER TWO SEASONS. THE OPERATIONS WILL NOT BE CONSTANT SO THE 25,780 GPD WILL MOST LIKELY NOT BE MET. THIS NUMBER COULD FLUCTUATE UP OR DOWN DEPENDING ON THE ACTIVITIES.

APPENDIX I: SAMPLE INSPECTION FORM

General Information (see reverse for instructions)					
Name of Project				**Inspection Date/Time**	
Inspector Name, Title & Contact Information					
Nature of Inspection					
Weather Conditions					

Note the condition of the pond and berm:

Was this inspection triggered by an electronic leak detection alarm? ☐ Yes ☐ No

If yes, what was the alarm?

Unsafe Conditions for Inspection

Did you determine that any portion of your site was unsafe for inspection? ☐ Yes ☐ No

If "yes", complete the following:

- Describe the conditions that prevented you from conducting the inspection in this location:

- Location(s) where conditions were found:

General Information (see reverse for instructions)	
Water Level in Pond	
Distance from top of berm	
Risk of overtopping?	
Repair Actions Needed	
What is water level in monitoring well? Need to pump?	
Are there any changes in operation procedures?	

General Information
(see reverse for instructions)

Any other items?

Inspector Certification and Signature
(see reverse for instructions)

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Inspector: _____ **Date:**

Printed Name and Affiliation: _____

APPENDIX J: DESIGN PLANS AND SPECIFICATIONS

SECTION 01571

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary environmental controls to control erosion and prevent sediment laden runoff from leaving the construction site and areas under the Contractor's control.

1.2 RELATED SECTIONS

A. Section 02075: Geotextiles

1.3 REFERENCES

A. AASHTO M 288: Geotextile Specifications for Highway Applications

B. AASHTO Construction Stormwater Field Guide

C. ASTM D 4355: Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

D. ASTM D 4491: Water Permeability of Geotextiles by Permittivity

E. ASTM D 4751: Determining Apparent Opening Size of a Geotextile

F. Utah Pollutant Discharge Elimination System, Utah Construction General Permit (UCGP)

1.4 DEFINITIONS

A. Check Dam – A fiber roll or stone structure placed across a roadside ditch to temporarily protect ditch from channel erosion by slowing velocity of stormwater runoff and intercepting and trapping sediment.

B. Disturbed Area – Areas within a construction site where existing vegetative cover, or existing stabilized areas, have been removed or altered and exposed soils are susceptible to increased erosion and sedimentation.

C. Drop-Inlet Barrier – A barrier placed around a storm drain inlet grate, situated outside of roadway pavement condition, that is designed to intercept and trap sediment-laden runoff before entering the storm drain system.

D. Fiber Roll – Wood excelsior, rice or wheat straw or coconut fibers rolled or bound netting to form a tube-like structure used to intercept and trap sediment.

E. Final Stabilization – Procedures and controls completed as the final measure to protect disturbed areas of a construction site from erosion and sedimentation until vegetation regrowth occurs to provide ultimate erosion protection.
   1. Includes work within areas to be vegetated such as establishing final grades, placing topsoil, incorporating seed; roughening slopes by walking track-mounted equipment up and down slopes; applying mulch, erosion control blanket, flexible channel liner; and installing other landscape treatments to protect exposed soils from erosion.
   2. Includes work within areas intended to remain unvegetated such as placing final pavement; installing stone, gravel and other stable material that will prevent erosion of underlying soil.

F. Gutter-Inlet Barrier – A device designed and prefabricated to secure to the top, envelop or hang below a storm drain inlet grate, situated within roadway pavement condition, that keeps sediment and debris from entering the storm drain system.

G. Pipe-Inlet Barrier – A barrier placed at a pipe inlet that intercepts and traps sediment before entering the pipe.

H. Sediment Trap – A small temporary excavated basin installed at low points on a construction site designed to trap sediment-laden runoff to allow sediment to settle out before leaving site.

I. Silt Fence – A geotextile fabric fence used to intercept and trap sediment in a sheet flow situation, along the perimeter of a disturbed area.

J. Slope Drain – A polyethylene pipe temporarily placed on a slope to collect and transport storm runoff down the face of a slope until permanent drainage facilities are installed or vegetation growth is adequate.

K. Stabilized Construction Entrance – A layer of stone, underlined with a geotextile fabric, placed at a construction site entrance or exit used to reduce the amount of sediment or mud tracked onto adjacent paved roadways by vehicles leaving the construction site.

L. Straw-Bale Barrier – Temporary barrier installed by placing straw bales end to end along perimeter of a disturbed area designed to intercept and slow sediment laden runoff before it leaves a construction site.

M. Temporary Berm – A ridge of compacted soil with or without a shallow ditch that diverts stormwater runoff from a slope to a controlled release point.

N. Temporary Environmental Fence – A high-visibility fence barrier used to delineate and prevent encroachment on sensitive areas.

1.5 SUBMITTALS

A. Manufacturer's product data sheets and recommended installation instructions.

PART 2 PRODUCTS

2.1 TEMPORARY ENVIROMENTAL CONTROLS

A. Fiber Roll
   1. Diameter (minimum weight per linear foot)
      a. 18 inch (3 lb per linear foot)
      b. 12 inch (2 lb per linear foot)
      c. 9 inch (1 lb per linear foot)
   2. Functional Longevity – 24 months minimum (includes netting material).
   3. Matrix material – Wood excelsior, rice or wheat straw, and coconut fibers (coir) or in combination.
      a) Material must be weed free.
   4. Netting – UV stabilized synthetic or coir material, with 1 inch maximum opening size, secured at end for matrix containment.
   5. Wood Stakes
      a. 18 inch Fiber Roll – ¾ inches and 1½ inches by 3 feet minimum dimensions.
      b. 12 inch Fiber Roll – ¾ inches and 1½ inches by 18 inch minimum dimensions.
      c. 9 inch Fiber Roll – ¾ inches and 1½ inches 18 inch minimum dimensions.

B. Silt Fence. Refer to EN Series Standard Drawings.
   1. Silt Fence Fabric – 3 foot minimum width, conforming to Table 7 of AASHTO M 288.
   2. Wood Post – 1½ inches by 1½ inches by 4 feet minimum dimensions.

3. Fasteners – Staples, wire, cable ties, or nails sufficient to maintain fabric attachment to post.

C. Check Dam. Refer to EN Series Standard Drawings
1. Fiber Roll – 12 inch diameter, or
2. Stone – Angular, well-graded 2 to 6 inch diameter.

D. Drop-Inlet Barrier. Refer to EN Series Standard Drawings
1. Fiber Roll – 18 inch diameter, or
2. Silt Fence
   a. Wooden Support Frame – 2 by 4 inch (nominal) wood studs.

E. Gutter-Inlet Barrier
1. Apparent Opening Size (ASTM D 4751) – between 20 and 40 sieve.
2. UV Resistance (ASTM D 4355) – 65percent minimum.
3. Flow Rate (ASTM D 4491) – 100 gpm/ft^2 minimum.
4. Filter Material – Monofilament, woven or nonwoven geotextile.
5. Provide protection to entire inlet opening.
6. Types:
   a. Above Inlet Grate
      1) Mount securely to the top side of the inlet grate at each corner with cable ties, wire or similar.
   b. Inlet Cover Grate
      1) Sewn geotextile fabric that envelopes entire inlet grate.
      2) Must have built-in lifting straps or other device to allow removal of inlet grate and barrier.
   c. Below Inlet Grate
      1) Mount device securely to the inlet grate or have independent frame that allows geotextile bag to hang below grate to capture runoff.
      2) Must be designed with a bypass feature that allows stormwater to be conveyed into the conveyance system when geotextile is filled to capacity.
      3) Must be able to remove from storm drain inlet and maintain device without dumping captured sediment into the storm drain system.

F. Pipe-Inlet Barrier. Refer to EN Series Standard Drawings.
1. Fiber Roll – 18 inch diameter, or
2. Stone – Angular, well-graded 2 to 6 inch diameter.

G. Temporary Berm. Refer to EN Series Standard Drawings.
   1. Compacted existing soil.
   2. Free of debris, such as trees, brush, obstructions and other objectionable material that will not allow for compaction of berm material.

H. Temporary Environmental Fence
   1. Fence Fabric
      a. Polyethylene, high-density (HDPE) and UV stabilized
      b. Height – 4 ft minimum
      c. Color – Orange
   2. Posts
      a. Wood Post – 1½ inches by 1½ inches by 4 feet minimum dimensions.
      b. Fasteners – Staples, wire, cable ties or nails sufficient to maintain fabric attachment to post.

I. Sediment Trap. Refer to EN Series Standard Drawings.
   1. Stone – Angular, well-graded 6 to 12 inch diameter

J. Slope Drain. Refer to EN Series Standard Drawings.
   1. 12 inch diameter single wall polyethylene pipe
   2. Polyethylene pipe end section
   3. Stone – Angular, well-graded 6 to 12 inch diameter
   4. Wood Stakes – 1½ inches by 1½ inches by 3 feet minimum dimensions.

K. Stabilized Construction Entrance. Refer to EN Series Standard Drawings.
   1. Stone – Crushed aggregate, well-graded 2 to 3 inch diameter.
   2. Geotextile Fabric (Separation) – Refer to Section 02075.

L. Straw-Bale Barrier. Refer to EN Series Standard Drawings.
   1. Straw Bales – Certified weed free straw bales by the Utah Department of Agriculture.
   2. Wood Stakes – 1½ inches by 1½ inches by 4 feet minimum dimensions.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install appropriate controls as shown before beginning earth disturbing activities.

B. Refer to installation procedures outlined in EN Series Standard Drawings and the AASHTO Construction Stormwater Field Guide.

C. Install temporary environmental fence in the required locations before construction activities begin.
   1. Install posts at a 12 ft maximum spacing so the fence does not sag more than 2 inches between posts.
   2. Weave the fence over the support posts alternating every two loops and secure it to the posts with fasteners.

D. Install Gutter-Inlet Barrier according to manufacturer's recommendations.

3.2 INSPECTION

A. Check installed controls before and after each rain event to verify proper working function and compliance with the UCGP.

B. Replace controls that are not properly working to prevent erosion and sedimentation.

3.3 MAINTENANCE

A. Maintain controls to function properly until surrounding disturbed areas have met final stabilization measures.

B. Remove accumulated sediments from controls when depth reaches 50 percent of the control height or when it interferes with the performance of the control.

C. Properly dispose of accumulated sediment.

3.4 REMOVAL

A. Remove temporary environmental controls when surrounding disturbed areas have met final stabilization measures, except as follows:
   1. Do not remove perimeter controls, such as silt fence, fiber rolls or straw bales, when they protect a wetland or waterway unless the surrounding area meets final stabilization requirements identified within the UCGP.
   2 When the Engineer determines that controls should remain in place.

B. Remove temporary environmental fence and posts upon completion of construction.

END OF SECTION

SECTION 02056

EMBANKMENT, BORROW, AND BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Embankment, backfill, and bridge approach embankments.

1.2 RELATED SECTIONS

A. Section 03575: Flowable Fill

1.3 REFERENCES

A. AASHTO M 145: Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

B. AASHTO T 11: Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

C. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates

D. AASHTO T 99: Moisture-Density Relations of Soils Using a 2.5 kg (5.5-lb) Rammer and a 305 mm (12 inch) Drop

E. AASHTO T 180: Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 inch) Drop

F. UDOT Materials Manual of Instruction

G UDOT Minimum Sampling and Testing Requirements

1.4 DEFINITIONS

A. Well-graded material – Material having an even distribution of different particle sizes. This even distribution of particles of different sizes results in a dense mass upon compaction.

1.5 SUBMITTALS

A. Provide the following before delivering material to the project:
   1. Supplier and source of materials.
   2. Gradation analysis. Refer to AASHTO T 27 and T 11.

3. Soil classification when applicable. Refer to AASHTO M 145.
4. Maximum Dry Density and Optimum Moisture Determination
   a. Use AASHTO T 180 Method D for A-1 soils and AASHTO T 99 Method D for all other soils.

B. Engineering proposal for alternate materials or trench configurations for drainage pipe bedding and pipe backfill as outlined in this Section, Article 2.8 C.

1.6 ACCEPTANCE

A. Acceptance sampling and testing is according to UDOT Minimum Sampling and Testing Requirements.

B. Engineer reserves the right to select and test material from any location at the construction site.
   1. Establish the limits of nonconforming material sampled non-randomly and correct.

C. Density Requirements – Acceptance is on a lot-by-lot basis.

D. Remove nonconforming material and replace with acceptable material.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide materials free of contamination from chemical or petroleum products for embankment and backfill placements. Materials may include recycled Portland Cement Concrete.
   1. Do not include asphalt pavement materials.

2.2 MATERIALS

A. Borrow
   1. Classifications A-1-a through A-4. Refer to AASHTO M 145.

B. Granular Borrow
   1. Classification A-1-a. Refer to AASHTO M 145.
   2. Non-plastic, well-graded, 3 inch maximum.

C. Granular Backfill Borrow
   1. Classification A-1-a. Refer to AASHTO M 145.
   2. Well-graded, 2 inch maximum.

D. Free-Draining Granular Backfill
   1. Meet the following gradation:

Table 1

Free Draining Granular Backfill Gradation	
Sieve Size	**Percent Passing**
1½ inch	90-100
1 inch	20-55
¾ inch	0-15
⅜ inch	0-5

E. Embankment For Bridge
   1. Classification A-1. Refer to AASHTO M 145.
   2. 3 inch maximum.

2.3 EMBANKMENT

A. Borrow or suitable roadway excavation materials excluding organic, frozen, or contaminated soils.

2.4 DRAINAGE PIPE BEDDING AND BACKFILL

A. Drainage Pipe Bedding and Drainage Pipe Backfill
   1. Granular Backfill Borrow, Classification A-1. Refer to AASHTO M145.
      a. Well-graded material.
      b. Maximum aggregate size is 1½ inches for plastic pipe, 2 inches for all other pipes.
   2. Flowable fill. Refer to Section 03575.
      a. Use only for drainage pipe backfill.

B. Other materials or trench configurations for drainage pipe bedding and backfill may be used only upon approval of the Contractor's engineering proposal. Proposals using this option may include the use of native material or uniformly graded materials enclosed in an appropriate drainage geotextile. Any proposal must include all of the following:
   1. Stamped drawings and specifications signed and sealed by a Professional Engineer licensed in the state of Utah.
   2. Evaluation of site specific conditions and surrounding soils, including potential for migration of fines.
   3. A structural evaluation of the pipe support system for the proposed pipe that includes the pipe structural capacity and the depth of fill.
   4. Complete bedding or backfill source information including gradation, soil classification, and laboratory testing reports.

PART 3 EXECUTION

3.1 GENERAL

A. Complete clearing, grubbing, stripping, and stockpiling topsoil before placing material.

B. Requirements when placing material during freezing or snowy conditions:
   1. Do not place embankment on frozen or snow-covered areas.
      a. Remove snow and frozen material from embankments, foundations, and borrow areas and furnish embankment material that can be compacted to the specified density.
         1. Measure removed material and provide quantities to the Engineer.
         2. The Department does not pay for removed material, frozen embankment replacement, or replacement material for a working platform or foundation meeting specification requirements if unfrozen.
   2. Do not deliver or use frozen material.

C. Use appropriate compaction equipment adjacent to pipes, abutments, back walls, approach slabs, wing walls, retaining walls, and other structures.
   1. Expand the width of the trench to accommodate necessary compaction equipment.
   2. Compact by hand areas where compaction equipment cannot compact the soil.

D. Over-excavate unsuitable material as directed by the Engineer.

E. Do not use unsuitable material for embankment or backfill placement.

F. Density Requirements
   1. Borrow, Granular Borrow, Granular Backfill Borrow, Embankment for Bridge, and Drainage Pipe Bedding
      a. Meet minimum density test average of 96 percent of maximum laboratory density with no single determination lower than 92 percent.
         1) Use AASHTO T 180 Method D for A-1 soils and AASHTO T 99 Method D for all other soils.
         2) Maintain appropriate moisture for compaction during processing.

2. Drainage Pipe Backfill
   a. Meet minimum density test average of 92 percent maximum laboratory density with no single determination less than 90 percent.
      1) Use AASHTO T 180 Method D for A-1 soils.
      2) Maintain appropriate moisture for compaction during processing.
   b. Meet the pavement section material density requirement for pipes that encroach into the pavement section or use flowable fill.
3. Meet 100 percent of the developed field density for material with more than 30 percent retained on the ¾ inch sieve.
   a. The Department develops a field density compaction curve according to UDOT Materials Manual of Instruction Section 989.
4. Free-Draining Granular Backfill
   a. Meet 100 percent of the developed field density.
      1) The Department develops a field density compaction curve according to UDOT Materials Manual of Instruction Section 989.

3.2 EMBANKMENT AND BORROW PLACEMENT

A. Place roadway excavation or borrow or both in embankment section with the highest quality material in the top portion of the embankment.

B. Scarify and compact the top 8 inches of the surface of the working platform or foundation to at least 90 percent of maximum laboratory density when the embankment height is 6 ft or less.

C. Break and scarify all underlying concrete pavement surfaces so that pieces do not exceed 1 ft^2 before placing embankment over an existing concrete pavement surface that is outside the limits of removal or excavation shown.
   1. Remove other pavement surfaces that are not Portland Cement Concrete.

D. Maintain Drainage
   1. Grade and maintain the roadway to ensure adequate drainage.
   2. Maintain drainage pipes and drainage ditches or provide temporary facilities when interrupting items such as irrigation systems, sewers, and under-drains.

E. Place an initial layer to act as a working platform over soft, wet ground when approved by the Engineer.
   1. Density requirements do not apply to the working platform.
   2. Meet density requirements for embankment placed above the working platform.

F. Do not place initial layer of embankment until Engineer inspects and accepts the working platform or foundation.

G. Spread embankment materials uniformly in layers not exceeding 1 ft (uncompacted depth) and compact to the density requirements.
   1. Reduce the lift thickness or modify operations if tests show unsatisfactory density.

H. Finish subgrade surface within ±0.2 ft of line and grade.

I. Do not use rock or broken concrete materials over 1 ft in any dimension.

J. Distribute larger particles so space exists for placing and compacting embankment material.

K. Do not place rocks larger than 4 inches or broken concrete within 1 ft of the subgrade surface.

L. Do not use compacting equipment that causes shear failure in the embankment.

3.3 GRANULAR BORROW, GRANULAR BACKFILL BORROW, AND BACKFILL PLACEMENT

A. Finish surface within ± 0.1 ft of line and grade.

B. Compact material in maximum 6 inch layers (uncompacted depth) to the density requirement.

C. Backfill for structures such as bridges, foundations, box culverts, drains, and other structures.
   1. Place Embankment unless otherwise shown.

3.4 DRAINAGE PIPE FOUNDATION, BEDDING, AND BACKFILL PLACEMENT

A. Place in 6 inch layers (uncompacted depth) and compact to the density requirement.

B. Place uniform layers of drainage pipe backfill on both sides of the pipe and compact to the density requirement before placing successive lifts.

C. Fully compact the haunch areas.

3.5 EMBANKMENT FOR BRIDGE PLACEMENT

A. Construct bridge approach embankments from the existing ground up with the specified material to the limits defined in this Section and according to DD Series Standard Drawings.
   1. Approach Embankments
      a. Place embankment beneath the bridge except riprap or other described materials used for MSE walls.
      b. Place embankment from the bridge abutment centerline station to a point measured at least 150 ft away from the abutment along the approach roadway centerline and on the inside of abutments.
      c. Use the described material throughout the length of the walls where retaining walls are located beyond this delineation.
   2. Intersecting Roadway Embankments
      a. Place embankment from approximate edge of approach roadway at least 60 ft along intersecting roadway centerline.
   3. Adjoining Embankments
      a. Place embankment at least 10 ft outward from edge of approach roadway pavement when adjoining embankment is not an approach embankment.

C. Do not place initial layer of embankment until foundation or working platform is verified by the Engineer.

D. Spread embankment materials uniformly in layers not exceeding 1 ft (uncompacted depth) and compact to the specified density requirements before placing the next layer. Reduce the lift thickness if tests show unsatisfactory density.

E. Finish surface within ±0.2 ft of line and grade.

3.6 FREE-DRAINING GRANULAR BACKFILL PLACEMENT

A. Compact material in 1 ft maximum layers to the density requirement.

B. Finish surface within ±0.2 ft of line and grade.

END OF SECTION

SECTION 02231

SITE CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Clear, grub, remove, and dispose of trees, stumps, and debris within the designated limits of the roadways, channels, easements, and other designated areas.

1.2 RELATED SECTIONS

A. Section 01355: Environmental Compliance

B. Section 01571: Temporary Environmental Controls

C. Section 02221: Remove Structure and Obstruction

1.3 REFERENCES **Not Used**

1.4 DEFINITIONS

A. Clear – Remove and dispose of trees, stumps, logs, limbs, sticks, vegetation, debris, and other material on the natural ground surface.

B. Grub – Remove and dispose of roots, buried logs, debris, organic matter, and other deleterious materials under the ground surface.

1.5 SUBMITTALS

A. Copies of disposal permits, agreements, or both.

1.6 PAYMENT PROCEDURES

A. Site Clearing and Grubbing when no bid item is included in the proposal:
   1. This work is considered incidental to other items of work and no separate measurement or payment will be made.
   2. Include all costs in other items of work.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 PREPARATION

A. Verify with the Engineer the vegetation or objects to be removed.

B. Review work procedures with the Engineer.

C. Schedule work carefully with consideration for property owners and general public.

D. Refer to Section 01571 for temporary environmental measures.

3.2 VEGETATION REMOVAL

A. Grub the areas 2 ft below natural ground, within the limits of clearing, of all stumps, roots, buried logs, and all other underground obstructions.

B. Stumps, roots, and non-perishable solid objects may remain in cleared areas where the embankment is:
   1. 2 ft or more above the natural ground.
   2. At least 2 ft away outside the slope stake lines.

C. Completely grub stumps and roots where a structure is to be constructed, piles are to be driven, or unsuitable material is to be removed.

3.3 BACKFILLING

A. Backfill all stump holes, cuts, depressions, and other holes resulting from clearing and grubbing within areas to receive embankment.
   1. Compact backfilled areas to the density of the surrounding ground.

B. Measure and pay separately for materials used for backfilling under Roadway Excavation or Borrow.

C. Consider Roadway Excavation and Borrow as incidental to the work when these items are not included in the bid proposal.
   1. No separate measurement or payment made in this case.

3.4 DISPOSAL

A. Dispose of material. Refer to Section 01355.

B. Do not dispose of material within the designated roadbed.

C. Outside of the Right-of-Way
   1. Acceptable when done according to prevailing laws including environmental laws, ordinances, regulations, and rules.

D. Inside the Right-of-Way
   1. Bury material at locations specified by or acceptable to the Engineer.
   2. Use material to widen embankments and flatten embankment side slopes as approved by the Engineer.
   3. Cover disposed material with at least 2 ft of earth and grade to drain properly.
   4. Reduce wood to chips a maximum of ½ inch thick for mulching cut and fill slopes.
      a. Chips may be buried or distributed uniformly on the ground surface and mixed with the underlying earth so the mixtures will not sustain burning.

3.5 TREE REMOVAL

A. Refer to Section 02221.

3.6 PROTECTION

A. Land monuments, property markers, or official datum points
   1. Protect until their removal is approved.
   2. Reference for re-establishment before removing.

B. Protect trees from damage to roots and branches if they are designated to remain.

C. Protect other vegetation and objects designated to remain.

END OF SECTION

SECTION 02316

ROADWAY EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavation of all material within designated areas.

B. Rock excavation and removal.

C. Placement of excavated material in embankment and other areas.

1.2 RELATED SECTIONS

A. Section 00725: Scope of Work

B. Section 00820: Legal Relations and Responsibility to the Public

C. Section 01355: Environmental Compliance

D. Section 01571: Temporary Environmental Controls

E. Section 01721: Survey

F. Section 02056: Embankment, Borrow, and Backfill

G. Section 02075: Geotextiles

H. Section 02231: Site Clearing and Grubbing

I. Section 02705: Pavement Cutting

J. Section 02912: Topsoil

1.3 REFERENCES

A. National Fire Protection Association (NFPA) Codes and Standards

B. OSHA Construction Standards

1.4 DEFINITIONS

A. Rock – Material that cannot be excavated and removed without blasting, chipping, cutting, or ripping.

1.5 SUBMITTALS

A. Proposed method of blasting, delay pattern, explosive types, and type of blasting mat cover.

B. Copies of disposal permits, agreements, or both.

1.6 ACCEPTANCE AND PAYMENT PROCEDURES

A. Payment is plan quantity by the cubic yard.
   1. Make no adjustment to plan quantities if staked quantities differ by 5 percent or less.

B. Notify the Engineer before beginning excavation in any area if the Contractor determines that the staked quantities differ from the plan quantities by more than 5 percent. The following procedures then apply:
   1. Provide calculations and plots according to Section 01721.
   2. Evaluate the "plan quantities" to "staked quantities" by individual cuts or balances as determined by the Engineer to provide the necessary accuracy.
   3. Do not begin excavation of any cut sections that the Contractor determines to differ from plan quantities by more than 5 percent until the calculations and plots have been submitted, reviewed, and approved by the Engineer.
      a. No payments, partial or final, will be made until submissions are provided and approved.

C. Approved quantities become the adjusted plan quantities and are paid at the original unit bid price when the Engineer determines the staked quantities differ from plan quantities by more than 5 percent.

D. Payment includes excavation, removal, transportation, and disposal when existing pavement is included in Roadway Excavation plan quantity.

PART 2 PRODUCTS

2.1 MATERIALS FOR OVER-EXCAVATED AREAS

A. Refer to Section 02056.

B. Geotextile Fabric – Refer to Section 02075.

2.2 USE OF ON-SITE MATERIALS

A. Refer to Section 00725.

2.3 EXPLOSIVES

A. Use explosives, delay fuses, and all blasting materials as recommended by the explosives firm. Refer to NFPA 495 – Explosive Materials Code.

PART 3 EXECUTION

3.1 PREPARATION AND PROTECTION

A. Refer to Sections 00820 and 01571.

B. Locate and protect utilities as necessary.

C. Clear and grub within the designated area before starting excavation. Refer to Section 02231.

3.2 BLASTING MATERIAL STORAGE

A. Store all explosives securely in compliance with Laws and Regulations. Refer to Section 00820. Refer to NFPA 495: Explosive Materials Code.

B. Mark all storage places clearly.

3.3 TOPSOIL

A. Remove topsoil according to Section 02912.

3.4 DEWATERING

A. Keep excavation free from surface and ground water through all stages of construction.
   1. Maintain adequate drainage during all stages of construction through pumping, pipe culverts, and drainage ditches.
   2. Provide temporary facilities when interrupting items such as irrigation systems, sewers, and under drainages.

3.5 EXCAVATION – STANDARD PROCEDURES

A. Finish excavation to reasonably smooth and uniform surface.

B. Provide and maintain satisfactory access to roads, streets, and adjacent property during all phases of construction according to the Traffic Control Plan.

C. Remove material in all cut sections to the depth shown.
   1. Scarify to an 8 inch depth and compact subgrade to at least 90 percent of maximum laboratory density before placing pavement section.

D. Excavate and waste unsuitable material.

E. Material for backfilling or finishing
   1. Use suitable granular material encountered in excavation to construct the top layers of embankment, finishing the roadbed, or backfill when directed by the Engineer.
   2. Haul the granular material directly from excavation to the final position on the roadbed when practical.

3.6 ROCK REMOVAL – NONEXPLOSIVE METHOD

A. Excavate solid rock 6 inches to 1 ft below subgrade and backfill with acceptable material.
   1. Rock removed more than 1 ft below subgrade will not be measured or paid for.
   2. Backfilling depth greater than 1 ft below subgrade will not be measured or paid for.

3.7 ROCK REMOVAL – EXPLOSIVE METHOD

A. Comply with OSHA Constructions Standards 1926 Subpart U - Blasting and the Use of Explosives.

B. Comply with NFPA 495 – Explosive Materials Code.

C. Provide a qualified explosives expert to act as an advisor and consultant during drilling and blasting operations.

D. Do not blast beyond designated areas.

3.8 ROCK FACES

A. Scale rock cuts of all loose rocks and fragments and leave in a neat and safe condition.

3.9 PAVEMENT

A. Cut existing pavement on the designated lines with straight vertical edges free from irregularities when joining new construction to existing pavement. Refer to Section 02705.

B. Excavate all pavement as shown.

C. Dispose of pavement using methods acceptable to the Engineer according to all applicable rules and regulations and as follows:
   1. Inside the right-of-way as embankment, subject to the approval of the Engineer. Refer to Section 02056.
   2. Outside the right-of-way subject to the approval of the Engineer. Refer to Section 01355.

END OF SECTION

SECTION 02318

DITCH EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Small ditch and surface ditch excavation.

1.2 RELATED SECTIONS

A. Section 02056: Embankment, Borrow, and Backfill

1.3 REFERENCES Not Used

1.4 DEFINITIONS

A. Small ditch – Ditch or channel, not V-shaped, with a bottom width less than 12.0 ft.

B. Surface ditch – V-shaped, 1.0 ft deep minimum and 3.0 ft wide across the top, or as shown.

1.5 SUBMITTALS Not Used

PART 2 PRODUCTS Not Used

PART 3 EXECUTION

3.1 SMALL DITCH EXCAVATION

A. Form the ditch as shown.

B. Place and compact excavated material in embankments. Refer to Section 02056.

3.2 SURFACE DITCH EXCAVATION

A. Construct the ditch along the contour of the ground.

B. Place excavated material to form a berm on the downhill side of the ditch.

C. Shape the ditch and berm so that power-driven mowers can operate on the graded surface.

END OF SECTION

SECTION 02821

CHAIN LINK FENCING AND GATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Chain link fencing and gates.

1.2 RELATED SECTIONS

A. Section 03055: Portland Cement Concrete

1.3 REFERENCES

A. AASHTO M 111: Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products

B. AASHTO M 181: Chain Link Fence

C. AASHTO M 232: Zinc Coating (Hot Dip) on Iron and Steel Hardware

D. AASHTO M 270: Structural Steel for Bridges

E. AASHTO M 280: Zinc-Coated (Galvanized) Steel Barbed Wire

F. ASTM A 121: Metallic-Coated Carbon Steel Barbed Wire

G. ASTM A 194: Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

H. ASTM A 392: Zinc-Coated Steel Chain-Link Fence Fabric

I. ASTM F 436: Hardened Steel Washers

J. ASTM A 491: Aluminum-Coated Steel Chain-Link Fence Fabric

K. ASTM A 563: Carbon and Alloy Steel Nuts

L. ASTM F 668: Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric

M. ASTM C 1107: Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

N. ASTM F 1043: Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework

O. ASTM F 1083: Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

P. ASTM F 1554: Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

Q. AWS D1.1 Structural Welding Code

1.4 DEFINITIONS Not Used

1.5 SUBMITTALS Not Used

PART 2 PRODUCTS

2.1 GENERAL

A. Concrete
   1. Class B Concrete – Refer to Section 03055.

B. Non-shrink Grout
   1. Refer to ASTM C 1107.

C. Anchor Bolt Assembly
   1. Anchor Bolts – Refer to ASTM F 1554.
   2. Nuts – Refer to ASTM A 563 or ASTM 194.
   3. Washers – Refer to ASTM F 436.

D. Base Plate
   1. AASHTO M 270, Grade 36.
   2. Weld post to base plate according to AWS D1.1.
   3. Galvanize after fabrication according to AASHTO M 111.

2.2 POSTS, CAPS, RAILS, AND COUPLINGS

A. Pipe Posts and Rails
   1. Schedule 40, hot-dip galvanized coated pipe.
      a. Refer to ASTM F 1043 and ASTM F 1083.

B. Fittings
   1. Malleable cast iron or pressed steel coated.
      a. Refer to AASHTO M 232.

C. Caps
   1. Equip all pipe posts with a galvanized steel or malleable iron weather-resistant cap that fits securely over the posts, with an apron around the outside of the post.
      a. Refer to AASHTO M 232.
   2. Provide cap to permit passage of top rail when top rail is used.

2.3 CHAIN LINK FABRIC

A. Provide either Type I zinc-coated steel or Type II aluminum-coated steel fence fabric as specified in AASHTO M 181, ASTM A 392, and ASTM A 491.

B. Provide a polyvinyl chloride (PVC) coating when shown.
   1. Refer to ASTM F 668

C. Use 0.148 inch diameter wire for fence fabric 6 ft or higher and 0.120 inch diameter wire for fabric less than 6 ft high.

D. Provide 0.177 inch diameter spiral material for tension wires.

E. Tie fence fabric to supporting members with wire of the same diameter as the fence fabric wire.

2.4 BARBED WIRE

A. Provide zinc-coated barbed wire when zinc-coated fence is used as specified in AASHTO M 280.

B. Use 0.099 inch diameter barbed wire with 0.080 inch diameter 4-point barbs on 5 inch centers.

C. Provide aluminum coated barbed wire when aluminum coated fence is used as specified in ASTM A 121.

D. Provide a support arm for barbed wire on top of a chain link fence that supports a 200 lb vertical load at the end of the arm without causing permanent deflection.

2.5 GATES

A. Fabricate gate posts and frames of the sizes according to FG Series Standard Drawings.
   1. Fasten gate frame corners together with pressed steel or malleable iron corner ells, riveted or welded as shown.

2. Galvanize welded steel gate frames after fabrication.
   a. Refer to AASHTO M 111.
3. Do not use closed cells that will prohibit dipping into galvanizing tanks.

B. Follow the same standards for chain link fence fabric for covering the gate frames as for other fence fabric.

C. Furnish each gate with the appropriate hinges, latch, and drop-bar locking device.

PART 3 EXECUTION

3.1 INSTALL POSTS

A. Install according to FG Series Standard Drawings.

B. Do not exceed the following spacing requirements when placing posts:

Radii of Curve	Maximum Post Spacing
Tangent or 500 ft	10 ft
200 ft to 500 ft	8 ft
100 ft to 200 ft	6 ft
0 ft to 100 ft	5 ft

C. Install brace posts at maximum 500 ft intervals and at angle points of 30 degrees or greater.

D. Set posts in concrete walls where required.
1. Set posts or post sockets in concrete walls to an embedment depth of at least 18 inches.
2. Use 0.048 inch thick galvanized metal pipe sleeve socket with an inside diameter that allows post to fit loosely.
3. Coat the inside of the socket and the outside of the posts with bituminous paint.
4. Use non-shrink grout to fasten the post in the socket.

E. Set posts in concrete bases.
1. Place concrete at least 6 inches below each post.
2. Construct at least 12 inch diameter bases for end posts, pull posts, corner posts, gate posts, and line posts.

F. Set posts in bridge parapets, and curbs as shown.

G. Install chain link fence on a structure as shown.

3.2 INSTALL FENCE FABRIC

A. Locate bottom of fence fabric on the roadway side of posts unless otherwise specified.
   1. Place fabric approximately 1 inch above the ground.
   2. Maintain a straight grade between posts by excavating high points of the ground.
   3. Fill depression in the natural ground to within 1 inch of the bottom of fence.

B. Stretch the fabric taut and securely fasten to fence posts.
   1. Use stretch bars and metal bands to fasten fence fabric to terminal, gate, corner, and pull posts.
      a. Space metal bands at 1 ft intervals along the post.
   2. Cut the fabric at corner and pull posts.
   3. Fasten fabric to line posts with tie wires or metal bands at 14 inch intervals.
   4. Attach the top edge of fabric to the top rail or tension cable with wire ties at approximately 24 inch intervals.
   5. Attach the bottom edge of the fabric to the bottom tension wire with wire ties spaced at 24 inch intervals.

3.3 INSTALL GATES

A. Install single gate or double gate as shown. Install plumb, level, and secure for full opening without interference.

B. Install ground-set items in concrete for anchorage as shown in the standard drawing or as recommended by the manufacturer. Adjust hardware for smooth operation.

C. Set gate openings according to manufacturer's dimensions.

D. Fabric description numbers:
   1. First number indicates height.
   2. Second number indicates width of fabric opening.

END OF SECTION

SECTION 02912

TOPSOIL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing and spreading topsoil on prepared areas.

B. Stripping topsoil from on-site locations and placing in stockpile.

C. Spreading stockpiled topsoil on prepared areas.

1.2 RELATED SECTIONS Not Used

1.3 REFERENCES

A. AASHTO T 194: Determination of Organic Matter in Soils by Wet Combustion

B. Textural Triangle National Soils Handbook

1.4 DEFINITIONS Not Used

1.5 SUBMITTALS

A. Submit for information, Contractor-furnished topsoil laboratory test results from each topsoil source to be used a minimum of seven working days before soil delivery.

B. Submit for information, soils samples according to this Section, Article 2.2, paragraph A.

PART 2 PRODUCTS

2.1 CONTRACTOR FURNISHED TOPSOIL

A. Determine PH, EC, and SAR with a saturated soil paste or 1:1 soil/water testing method. Meet the following:

1.	PH	6.0 to 8.0
2.	Electrical Conductivity (EC)	Less than 4 ds/m
3.	Sodium Adsorption Ratio (SAR)	Less than 10

B. Organic Matter
   1. 1 to 20 percent.
   2. Determined by the release upon combustion Walkley-Black or modified Walkley-Black testing method. Refer to AASHTO T 194.

C. Textural Classification
   1. Loam, sandy loam, silt loam, or sandy clay loam not exceeding the percentiles in Table 1. Refer to Textural Triangle National Soils Handbook, Part 603-5.

Table 1

Textural Classification	
Soil Component	**Percentile Range**
Sand	20 to 70
Silt	20 to 70
Clay	10 to 30

   2. Determine particle size analysis by the hydrometer testing method.

D. Topsoil free of:
   1. Subsoils (no B or C horizon soils)
   2. Coarse sand and gravel
   3. Stiff clay, hard clods, or hard pan soils
   4. Rock larger than 3 inches in any dimension
   5. Trash, litter, or refuse
   6. Noxious weeds and weed seeds

E. Topsoil may contain a maximum of five percent rock smaller than 3 inches.

2.2 SOURCE QUALITY CONTROL – CONTRACTOR FURNISHED MATERIAL

A. Obtaining Soil Samples
   1. Obtain soil samples while the Engineer is present. Provide no less than ½ lb per soil sample.
   2. Obtain samples from a thin slice of soil cut from the side of a freshly dug hole or by using a soil auger or sampling tube.
   3. Mix the several small samples taken from various places around the source together to produce a composite sample.
   4. More than one composite sample may be required if the topsoil horizon changes significantly across the source.
   5. Store samples in a clean container at room temperature and out of direct sunlight.
   6. Label the location and date on each sample container.
   7. Provide additional soil samples for verification if requested by the Engineer.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Complete final grading, trench settling, and surface preparation before placing topsoil.

B. Place and spread topsoil as the slope is being constructed on steep cut slopes steeper than 2:1 and higher than 15 ft that require the placement of topsoil. Finish according to this Section, Article 3.3, paragraph D.

C. Provide a suitable topsoil surface just before seeding on the remaining top soiled areas not covered under this article, paragraph B. Suitable topsoil surface is:
   1. Non-compacted and finished according to this Section, Article 3.3.
   2. Weed free.
   3. Finish grade uniform surface with smooth transitions between grade changes and disturbed areas.

D. Do not strip or handle wet topsoil.

E. Establish finish grade at 1 inch below the top of all walks, curbs, mow strips, and other hard surfaces for areas receiving seed or turf seed and 1½ inch for areas receiving turf sod.

3.2 STRIP AND STOCKPILE TOPSOIL

A. Strip the topsoil:
   1. Only from areas shown or determined by Engineer.
   2. To a depth determined by the Engineer.

B. Remove and dispose of any roots larger than 2 inches in diameter or 12 inches in length.

C. Stockpile stripped topsoil:
   1. At locations acceptable to the Engineer.
   2. So that placement or activity around the stockpile does not damage or impact any existing trees, shrubs, or environmentally sensitive areas. Obtain appropriate clearances if such impacts are unavoidable.

D. Grade to minimize erosion on and around the stockpiles.

3.3 SPREAD STOCKPILED AND CONTRACTOR-FURNISHED TOPSOIL

A. Clear area to receive topsoil of all trash, debris, weeds, and rock 3 inches or larger and dispose of objectionable material in an approved manner.

B. Place and spread the stockpiled topsoil over the prepared slopes to the plan depths. Use 4 inches if no depth is indicated in the plans.

C. Disc or harrow the placed topsoil along the contour on slopes 3:1 and flatter or cat-track the slopes to create continuous cleat tracks that run parallel with the contours.

D. Cat-track slopes steeper than 3:1 to create continuous cleat tracks that run parallel with the contours.

END OF SECTION

SECTION 02922

SEED, TURF SEED, AND TURF SOD

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Seed, turf seed, and turf sod requirements and application.

B. Surface preparation.

1.2 RELATED SECTIONS

A. Section 02912: Topsoil

1.3 REFERENCES

A. Utah Seed Law

1.4 DEFINITIONS **Not Used**

1.5 SUBMITTALS

A. Submit for information, copy of the purchase order documenting that all seeds, including substitutions, have been acquired before the seeding window begins.
   1. Refer to this Section, article 1.6 for seeding information.
   2. List the common and botanical name for each seed species on the purchase order.

B. Submit for information, certification that turf sod is nursery grown and contains a minimum of three varieties of Kentucky Blue Grass.

C. Submit for information, certification indicating the date and time sod was cut at the nursery.

D. Submit for information, fertilizer labels.

F. Submit for information legible copy of Seed Certification – Include the following on seed certification reports and labels:
   1. Botanical name (include variety if applicable)
   2. Common name
   3. Name of seed testing laboratory
   4. Lot number and address of the seed company

5. Weed seed (percent)
6. Other crop seed (percent)
7. Inert matter (percent)
8. Pure live seed (percent)
9. Noxious weed seed (name and rate of occurrence)
10. Date tested (month and year)
11. Germination (percent)
12. Hard seed (percent)
13. Net weight (do not include container weight)
14. Pure live seed weight
15. Collection locations for native shrub and tree species (state, county, elevation)

G. Submit for information manufacturer's directions on drill calibration two working days before seeding. Refer to this Section, Article 3.3.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Mixing Seed
1. Notify Engineer seven calendar days before mixing seed.
2. Engineer will verify that the seed certification report or label represents the seed lot from which the seed is furnished.
3. Mix the different seed varieties to provide an even blend.
4. Bag the mixed seed, seal the container, and attach a signed Department label to the exterior.

B. Deliver seed or turf seed to job site in original containers showing analysis of seed mixture, net weight, and date and location of packaging. Damaged packages are not acceptable.

C. Strip turf sod from nursery no more than 24 hours before laying.

D. Deliver fertilizer in containers showing weight, chemical analysis, and name of manufacturer. Store fertilizer in a weatherproof location.

1.7 SCHEDULE

A. Pre-measure the area to be seeded before ordering seed from supplier. The Engineer must approve the measuring technique and determined quantity.

B. Seeding Window
1. Complete all general roadside seeding within the appropriate seeding window.
2. Postpone seeding until the following year if the seeding is not completed within the given window.

3. A late winter exception to the seeding window may be obtained from the Engineer if suitable weather and soil conditions exist.

Elevation	Seeding Window
Below 4,000 ft	October 1 – December 31
4,000 to 6,000 ft	September 15 – December 1
Above 6,000 ft	September 1 – November 15

C. Turf seed and turf sod can be placed only after irrigation system is installed and operational.

D. Topsoil
   1. Refer to Section 02912.
   2. Place topsoil just before seeding to eliminate competition from weeds.
   3. Coordinate topsoil placement with the above seeding window.

PART 2 PRODUCTS

2.1 SEED AND TURF SEED

A. Meet the Utah Seed Law – Utah Code - Title 4, Chapter 16.

B. Supply seed on a pure live seed (PLS) basis.

C. Obtain seed from lots that have been tested by a state certified seed testing laboratory such as Association of Seed Analyst (AOSA) or Society of Commercial Seed Technologists (SCST).
   1. Seed germination test older than 18 months for grass seed and 9 months for shrub or tree seed are not acceptable.
   2. Based on the amount or type of seed required on a project, the Department may require additional testing by the Department of Agriculture.

D. Do not use wet, moldy, or otherwise damaged seed.

E. Seed Substitutions
   1. Contact the major seed brokers in the state to verify that the seed is unavailable before requesting a seed substitution.
   2. Obtain approval for a seed substitution.

2.2 TURF SOD

A. Healthy and well-rooted nursery grown Kentucky Blue Grass sod comprised of a minimum of three varieties and free of weeds.

B. Machine cut in straight, uniform strips or rolls, cut at a depth between ¾ inch and 1 inch.

2.3 FERTILIZER (turf sod and turf seed areas only)

A. Uniform in composition, dry, and free flowing.
   1. Turf seed or turf sod – Elemental nitrogen in granular form. Phosphorus and potassium are optional and may be applied with nitrogen in granules. Use a slow release form of a minimum 50 percent nitrogen such as sulfur coated urea or urea formaldehyde.
   2. Apply elemental nitrogen with a concentration ranging from 21-34 percent if hydroseeding method is used.

PART 3 EXECUTION

3.1 PREPARATION

A. Complete all final grading, irrigation work, trench settling, topsoil placement, and surface preparation before seed or sod application.

B. Prepare general seedbed for all seeded and sodded areas.
   1. Verify that a suitable topsoil surface has been prepared according to Section 02912 before seeding.
   2. Do not work topsoil or seed when the soil is saturated or frozen.

C. Prepare Turf Seedbed
   1. Review finish grade to confirm that topsoil is 1 inch below the top of all walks, curbs, mow strips, and other hard surfaces.
   2. Apply fertilizer at the rate of 2 lb/100 yd^2 and mix thoroughly into upper 2 inches of topsoil.
   3. Do not apply fertilizer and seed at the same time in the same machine.

D. Prepare Turf Sod Surface
   1. Review finish grade to confirm that topsoil is 1½ inch blow the top of all walks, curbs, mow strips, and other hard surfaces.
   2. Apply fertilizer at the rate of 2 lb/100 yd^2 and mix thoroughly into upper 2 inches of topsoil.
   3. Level and roll prepared areas using a 21 gal water-filled hand roller containing 8 to 10 gal of water.
   4. Lightly rake and dampen with water the top ⅛ to ⅝ inches of soil just before laying the sod.

3.2 SEEDING – GENERAL

A. Notify the Engineer seven working days before seeding.

B. Apply seed at the rate indicated in the Seed Schedule as shown. Note that drill seed and broadcast seed are applied at different rates.

3.3 DRILL SEEDING METHOD

A. Use the drill method of seeding on accessible slopes 3:1 and flatter.

B. Use a drill equipped with the following:
   1. Depth band
   2. Seed box agitator
   3. Seed metering device
   4. Furrow opener
   5. Packer wheels or drag chains

C. Use the drill manufacturer's directions in the presence of the Engineer. Calibrate the drill to apply seed at the rate indicated in the seeding schedule.

D. Space drill rows a minimum of 6 inches and a maximum of 8 inches.

E. Fill the seed boxes no more than half full when drilling on a slope.

F. Set depth bands to drill seeds to a ½ inch depth.

G. Drill along the contour.

H. Maintain the drill at the calibrated setting throughout the seeding operation.

I. Allow the furrows that are created by the drill to remain.

3.4 BROADCAST SEEDING METHOD

A. Use the broadcast method of seeding under the following conditions:
   1. Slopes steeper than 3:1.
   2. Slopes 3:1 and flatter where the area to be seeded is inaccessible to drill.
   3. The area to be seeded is not large enough to justify using a drill.
   4. Rocky surface conditions will damage a drill.

B. Obtain approval of the broadcast method by demonstrating the procedure on a 100 yd^2 area.

C. Evenly broadcast seed using either:
   1. A cyclone seeder or other approved mechanical seeder.
   2. A hydroseeder.
      a) Apply seed, water, and 300 lb of cellulose fiber mulch (tracer) per acre.

D. Do not seed during windy weather or when soil is saturated.

E. Incorporate the seed into the soil by one of three methods:
   1. Cat-tracking by running the dozer up and down the slope creating continuous cleat tracks that run parallel with the contours.
   2. Hand raking the seed in ½ inch deep and along the contours of the slope.
   3. Slope chaining by pulling the chain along the contour until the seed is covered.

F. Obtain approval from the Engineer that the seed has been adequately incorporated into the soil before applying wood fiber mulch, erosion control blanket, flexible growth medium, flexible channel liner, or other topdressing.

3.5 TURF SEEDING

A. Apply turf seed after seedbed preparation. Refer to this Section, Article 3.4, paragraph C.

B. Roll seeded areas using a hand roller half filled with water.

C. Lightly water and program the irrigation system to maintain a moist seedbed.

D. Rope off newly seeded areas along walkways using bright plastic ribbon tape attached to stakes.

3.6 TURF SOD PLACEMENT

A. Prepare sod bed and place sod with all edges and joints tightly butted.
   1. Do not stretch or overlap sod.
   2. Keep length seams in a straight line.

B. Lay turf sod with staggered joints and trim off excess material along the edges.

C. Roll sod immediately after placing using a hand roller half filled with water.
   1. Re-roll if depressions still remain.
   2. Thoroughly water with a fine spray to a depth sufficient that the underside of the new sod and soil immediately below the sod are thoroughly wet.

END OF SECTION

October 24, 2017

SPECIAL PROVISION

PROJECT # F-I70-1(90)7
PIN # 13804

SECTION 12100S

TEMPORARY EVAPORATION POND

Add Section 12100:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Construction of temporary evaporation pond for hydro-demolition waste water.

B. Maintenance, inspection and reporting of evaporation pond.

C. Disposal of waste materials.

D. Fencing.

E. Signage.

F. Construction of road improvements.

G. Construction of ditches.

H. Restoration of property.

1.2 RELATED SECTIONS

A. Section 01572: Dust Control

B. Section 02056: Embankment, Borrow, and Backfill

C. Section 02231: Site Clearing and Grubbing

D. Section 02316: Roadway Excavation

E. Section 02318: Ditch Excavation

F. Section 02821: Chain Link Fencing and Gates

G. Section 02912: Topsoil

H. Section 02922: Seed, Turf Seed, and Turf Sod

I. Section 13770: Pond Liner System

1.3 REFERENCES

A. Utah Department of Environmental Quality Groundwater Discharge Permit

B. UDOT Municipal Separate Storm Sewer System (MS4) Permit

1.4 DEFINITIONS **Not Used**

1.5 SUBMITTALS

A. Submit results of all compaction tests and seepage tests to Engineer. Include date, time, personnel present, project photos, and results.

B. If pond design is changed from advertisement package design, submit new drawings and details of pond for Engineer approval,

C. Submit verification that the pond is built according to approved drawings.

D. Submit weekly reports of pond depths, number of gallons dumped in pond, maintenance, repairs, and inspections.

E. Submit quarterly report to Utah Department of Environmental Quality in accordance with the provisions listed in the Groundwater Discharge Permit. Submit report to UDOT.

1. Utah Department of Environmental Quality
   195 North 1950 West
   Salt Lake City, UT 84114
   (801) 536-4400

2. Utah Department of Environmental Quality local representative:
   John Chartier, District Engineer
   Central Utah District
   70 Westview Drive
   Richfield, UT 84701
   (435) 896-5451 x314

F. Submit to Engineer leak collection sump pump specifications.

G. Submit to Engineer any changes to the evaporation pond size, location, proposed storage volume, or any change to the leak prevention mechanism.

1. If changes are made to the size, location, volume, or leak prevention mechanisms, allow two months for UDOT to obtain a new permit from the Utah Department of Environmental Quality.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

A. Refer to Section 02056.

2.2 LEAK COLLECTION AND RECOVERY SUMP (LCRS) SYSTEM

A. Install a Pond Leak Collection Pit at the lowest point of the pond.
   1. The LCRS Pit will have 3:1 (H:V) side slopes.
   2. The minimum allowable pit dimension is 10 feet by 10 feet, 5 feet in depth, and 5 feet bottom width
   3. Gravel porosity within the Pond Leak Collection Pit shall be a minimum of 0.3.

B. Install Schedule 40 Polyvinyl Chloride (PVC) pipe at a slope of 1 inch vertical drop to 50 feet horizontal from the Pond Leak Collection Pit to a Leak Collection Sump where water can be pumped.

C. Install a pump with sufficient capacity in the Leak Collection Sump to pump the water back into the pond.

2.3 POND LINER SYSTEM

A. Refer to Section 13770.

2.4 DEPTH GUAGE

A. Install a depth gauge, or other measurement tool approved by the Engineer, at a location approved by the Engineer that can be easily accessed and read for pond depths.

2.6 PRECIPITATION GAUGE

A. Install precipitation gauge at pond site that can be easily accessed and read for precipitation depths,

PART 3 EXECUTION

3.1 SITE PREPARATION

A. Clear and grub within the designated area before starting excavation. Refer to Section 02231.

B. Excavate the pond as shown on drawings or approved. Refer to Section 02316.

C. Construct pond dike/embankment with embankment material. Refer to Section 02056.

D. Compact pond embankments and upper 6 inches of the interior pond bottom, below the synthetic liner, to a minimum of 90 percent of the maximum standard proctor density at optimum moisture plus 3 percent. The maximum size of dirt clods in the compacted soil shall be less than 1 inch in diameter.

E. Install liner as soon as practicable after the subgrade preparation is completed in each area. During the deployment, keep subgrade free of all standing water. If the subgrade becomes wet and unstable, dry and recompact.

F. Before the liner installation begins, verify, in writing, and submit to the Engineer that:
   1. Lines and grades are in conformance with the approved drawings.
   2. The surface area to be lined has been compacted and is free of irregularities and abrupt changes in grade.

G. Testing of Compacted Earthwork:
   1. Perform compaction tests during pond construction at a frequency of not less than one test per 10,000 square feet of liner surface.

H. Testing of Pond Dikes:
   1. Perform compaction tests during embankment/dike construction at a frequency of not less than one test per lift per 300 linear feet.

I. Report to the Engineer any changes to the evaporation pond size, location, storage volume from the drawings, or any change to the leak prevention mechanism.

J. If changes are made to the size, location, volume, or leak prevention mechanisms, allow two months for UDOT to obtain a new permit from the Utah Department of Environmental Quality.

3.2 LINER INSTALLATION

A. Place liner layers. Refer to Section 13770.

B. Do not install liner during any precipitation, in presence of excess moisture (i.e. fog, rain, dew) or in the presence of excessive winds.

C. Install in accordance with written manufacturer's instructions.

3.3 TESTING

A. Prior to pond use, conduct pond seepage test:
   1. Equipment required
      a. Precipitation gauge
      b. Temperature gauge or recorder
      c. Class A evaporation pan or a four foot diameter stock tank cut down to a height of 10 inches
      d. Wooden pallet or platform for pan
      e. Appropriate length of six inch PVC pipe with a suitable anchor support base which won't harm the liner.
      f. Device to measure depth of water in pan and in pond stilling well.
      g. Platform or means to access pond stilling well.
   2. Fill the pond with water to a depth of 3-feet.
   3. After 3 feet of water has been in pond for 3 days, conduct testing for 8 consecutive days.
      a. Set up precipitation and temperature gauge and monitor daily.
      b. Place the evaporation pan or stock tank on a wooden platform leveled with shims if necessary, and locate as close to the pond as possible. The objective is to duplicate pond exposure as closely as possible (sun, wind, rain, etc.). Initial water level in the pan is to be approximately two inches below the top.
      c. Depth measurements of the pond and the evaporation pan are to be made and recorded daily at the same approximate time of day.
      d. Use an evaporation coefficient of 0.7 to determine pond evaporation.
      e. Data shall be provided to the Engineer for final seepage calculation. Refer to Section 13770 for additional information.
   4. The Engineer will witness all tests.
   5. After successful test is completed, dispose of water in pond.

3.4 FENCING

A. Install 6' high fence around entire pond according to drawings. Refer to Section 02821.

B. Install 6' high man gate with lock. Provide key and access to Engineer authorized personnel.

3.5 SIGNAGE

A. Place "Restricted Area" signs on fence 300-feet apart.

3.6 SURFACE DITCH

A. Grade surface ditches uphill of the pond to remove any surface water from entering the pond.

3.7 ROAD IMPROVEMENTS

A. Improve existing access road to include a truck parking area and a truck turnaround.

B. Maintain roadway, parking area, and turnaround to limit ruts.

C. Provide dust control during periods of active dumping. Refer to UDOT's MS4 Permit.

3.4 TOLERANCES

A. Pond Bottom:
   1. Sloped toward sump and not more than 2 inches from designated vertical elevations as shown on approved plans.

B. Embankment Tops:
   1. Within 1 inch from designated elevations.

3.5 INSPECTIONS

A. After pond is constructed and the seepage tests have been completed, schedule an inspection with the Engineer and the Utah Department of Environmental Quality. No dumping will occur until all inspections have been completed and the pond cleared for operation.

B. Inspect pond in person daily from April through October. Record pond depth, precipitation depth, and water level in sump.
   1. Any changes in inspection frequencies requires Engineer approval.

C. From November to March, monitor and record pond depth daily, either in person or via video monitoring. Ensure that depth of pond can be adequately seen by the video equipment. Inspect pond depth and water level in sump at least weekly in person.

D. Inspect pond in person within 10 hours of a significant rainfall event which produces 0.25 inches of rain within 24 hours.

E. In the case that pond levels drop more than the allowed seepage rate, all dumping of water will stop and the cause of the leakage will be investigated in accordance with the Groundwater Discharge Permit. The Utah Department of

Environmental Quality and the Engineer will be notified in accordance with the Groundwater Discharge Permit requirements.

3.6 MAINTENANCE OF EVAPORATION POND

A. Remove any trees in the berm.

B. Repair any areas where there is erosion.

C. Remove trash from the pond surface and adjacent areas.

D. Monitor water level in pond. When water level gets to 1.5 feet below top of embankment, prepare alternate methods for water disposal. When water level gets to 1.0 feet below top of berm, do not allow any more water trucks to dispose of water in the pond.

   1. Pump pond if necessary and dispose of waste water at a sewage treatment plant or store in tanks on site until pond levels go down.

   2. If needed, provide on-site storage tanks with secondary containment with sufficient capacity to contain at least 100% of the storage tank volume.

E. If waste water is leaking from the pond and/or infiltrating into the ground, immediately stop active dumping into the pond and take measures to stop the leaking and minimize the spread of contaminants into the ground.

F. Notify the Engineer and Utah Department of Environmental Quality (801-536-4400) of the spill.

G. Refer to the Groundwater Discharge Permit for the Contingency and Corrective Action Plan.

H. Any fines assessed to UDOT by the regulatory agencies will be paid for by the Contractor.

I. Pump, store, or transport waste water as required to repair or maintain the evaporation pond.

3.7 RESTORATION

A. At the end of operations, ensure that the pond is empty of water and the surface area is dry.

B. Remove fencing.

C. Dewater remaining sludge and dispose of at an approved landfill. Dispose of water removed from sludge at a sewage treatment plant or in accordance with local, state, and federal requirements.

D. Remove the upper liner first, geonet layer system second, and lower liner and appurtenances last.
   1. Meet all local, state and federal requirements for disposal.

E. Grade the site to its original contours. Achieve final grade by grading the surrounding soils from the area immediately adjacent to the pond.

F. Re-seed the pond site and provide the necessary care to establish a vegetative cover of at least 70% of the existing vegetation cover.

END OF SECTION

October 24, 2017

SPECIAL PROVISION

PROJECT # F-I70-1(90)7
PIN # 13804

SECTION 13770S

POND LINER SYSTEM

Add Section 13770:

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Material requirements for flexible impermeable synthetic liner and geonet layer.

1.2 RELATED SECTIONS NOT USED

1.3 REFERENCES NOT USED

1.4 DEFINITIONS NOT USED

1.5 SUBMITTALS

A. Liner and Geonet Layer
   1. Product data
      a. List of material properties and sample of product.
         (1) Catalog cuts.
      b. Manufacturer's recommended installation instructions
      c. Manufacturer's certificate and test report:
         (1) Statement certifying liner material is compatible with following materials:
            (a) Waste water from hydro-demolition activities
      d. Manufacturer's warranty certificate
      e. Company and Personnel Experience
      f. Documentation showing liner manufacturer's experience.
      g. Documentation showing the experience level and certifications of the manufacturer/installer and all personnel that will be working on the project. If manufacturer/installer is a different company than the liner manufacturer, documentation from the liner manufacturer shall be submitted certifying that the manufacturer/installer company, and all personnel that will be working on the project, has been trained and certified by the liner manufacturer and is under the direct control, supervision, and responsibility of the liner manufacturer.

h. Documentation indicating the names and experience of superintendent, quality control personnel, and seaming technicians proposed for the project.

2. Panel fabrication drawings showing panel identification number, panel dimensions, seam locations, details of boots and other special fabrications, penetration details, etc., and attachment methods.

B. Installation contractor's quality control field reports

C. Daily certification, in writing, that sand bedding surfaces on which the liner will be installed are adequately prepared and meet specifications.

D. Provide certificate of manufacturer's quality control and testing for each liner production batch delivered.

E. Provide manufacturer's shop quality control test reports on all shop seams in fabricated panel assemblies. Identify manufacturer's lot number(s), and location in each panel assembly.

1.6 QUALIFICATIONS

A. Liner Manufacturer: Company specializing in the manufacturer of liner material with minimum 10 years of documented experience and minimum of 10,000,000 square feet of material produced during the last year.

B. Installer:

1. All superintendents, quality control personnel, seaming technicians, and installers must be experienced and qualified for installations of the type being used on the project, and must be trained and certified by the liner manufacturer.
2. Installation Company to have successfully installed a minimum of 5,000,000 square feet of liner during the last 5 years.
3. Installation Company to have successfully worked in a similar capacity on at least 5 projects similar in complexity to the project described in the contract documents.
4. Installation Company to provide a list of not less than 5 projects each of not less than 100,000 square feet of installed membrane and/or similar to the complexity of the project described in the contract documents. Project list shall include project names, project location, project owner, square footage, project description, and contact name and telephone number.
5. If manufacturer and installer are separate companies, each company will meet the above requirements.

C. Personnel:

1. Key project personnel to be full-time employees of the installation contractor for at least 1 year and shall each have minimum documented experience of 1,000,000 square feet successful liner installation.
2. Project personnel to be trained and certified by the liner manufacturer and

written training certification submitted to the Owner prior to arrival at the jobsite.

3. "Key project personnel" to include, as a minimum: Project superintendent, Project master, quality control supervisor, quality control technicians, installers, and seaming (welding) technicians.
   a. Project Superintendent to have a minimum documented oversight experience of 10,000,000 square feet of successful liner installation.
   b. Project Master (or senior) welder to have a minimum documented welding oversight experience of 5,000,000 square feet successful liner installation.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products in accordance with manufacturer's written instructions and recommendations.

B. Maintain a dry subgrade for the placement of the liner.

1.8 WARRANTY

A. Manufacturer/installer to provide a 3 year, pro-rated warranty and guarantee liner system against:
   1. Faulty or inadequate design or performance;
   2. Improper assembly or installation;
   3. Defective workmanship or materials;
   4. Leakage, rupture or other failure.

B. The Owner's acceptance of satisfactory installation and operation to be based on:
   A. Completion of lining system installation and manufacturer's documentation of completed project according to approved plans and specifications.
   B. Testing of all seams and satisfactory repair and retesting of any defective areas.
   C. Completion and submittal of all liner installation documentation required by the specifications.

PART 2 PRODUCTS

2.1 LINER SYSTEM

A. For the upper and lower liner material use minimum 60 mil thick High Density Polyethylene (HDPE).
   1. Use HDPE geonet as a flow layer between liners.
   2. The liner shall conform to the liner manufacturer's criteria for the material and installation of the membrane liner expressed in units of volume per area per unit of time (gallons per square feet per

day).3. Membrane manufactured specifically for the purpose of liquid containment.

4. Produced free of holes, blisters, undispersed raw materials or sign of contamination by foreign matter.
5. Proved a textured, non-slip liner on sloped grades.
6. Liner shall be black in color.
7. Anchor the liner at the top of the pond per manufacturer's installation instructions.
8. Provide means for venting liner to prevent trapped air from accumulating underneath the liner and causing the liner to float.

B. Liners to meet properties shown in Table 2.

Table 2

Property	Test Method	Smooth HDPE	Textured HDPE
Thickness, mils Minimum Average Lowest Individual Reading	ASTM D 5199	 60 54	 60 54
Density, g/cm^3	ASTM D 1505	0.94	0.94
Tensile Strength Properties Yield Strength, lb/in Break Strength, lb/in Yield Elongation, % Break Elongation, %	ASTM D 6693	 90 250 12 700	 90 250 12 100
Tear Resistance, lb	ASTM D 1004	33	33
Puncture Resistance, lb	ASTM D 4833	66	66
Stress Crack Resistance, hrs	ASTM D 5397	300	300
Oxidative Induction Time, mins	ASTM D 3895	100	100
Seam Properties Shear Strength, lb/in Peel Strength, lb/in (fusion) Peel Strength, lb/in (extrusion)	ASTM D 6392	 81 65 52	 81 65 52

C. Accessories
1. Includes, but not limited to, factory-fabricated boots and stainless steel clamps for pipe penetrations, stainless steel shields, and adhesive and sealants as required for complete installation.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Test Seams in accordance with written manufacturer's instructions.

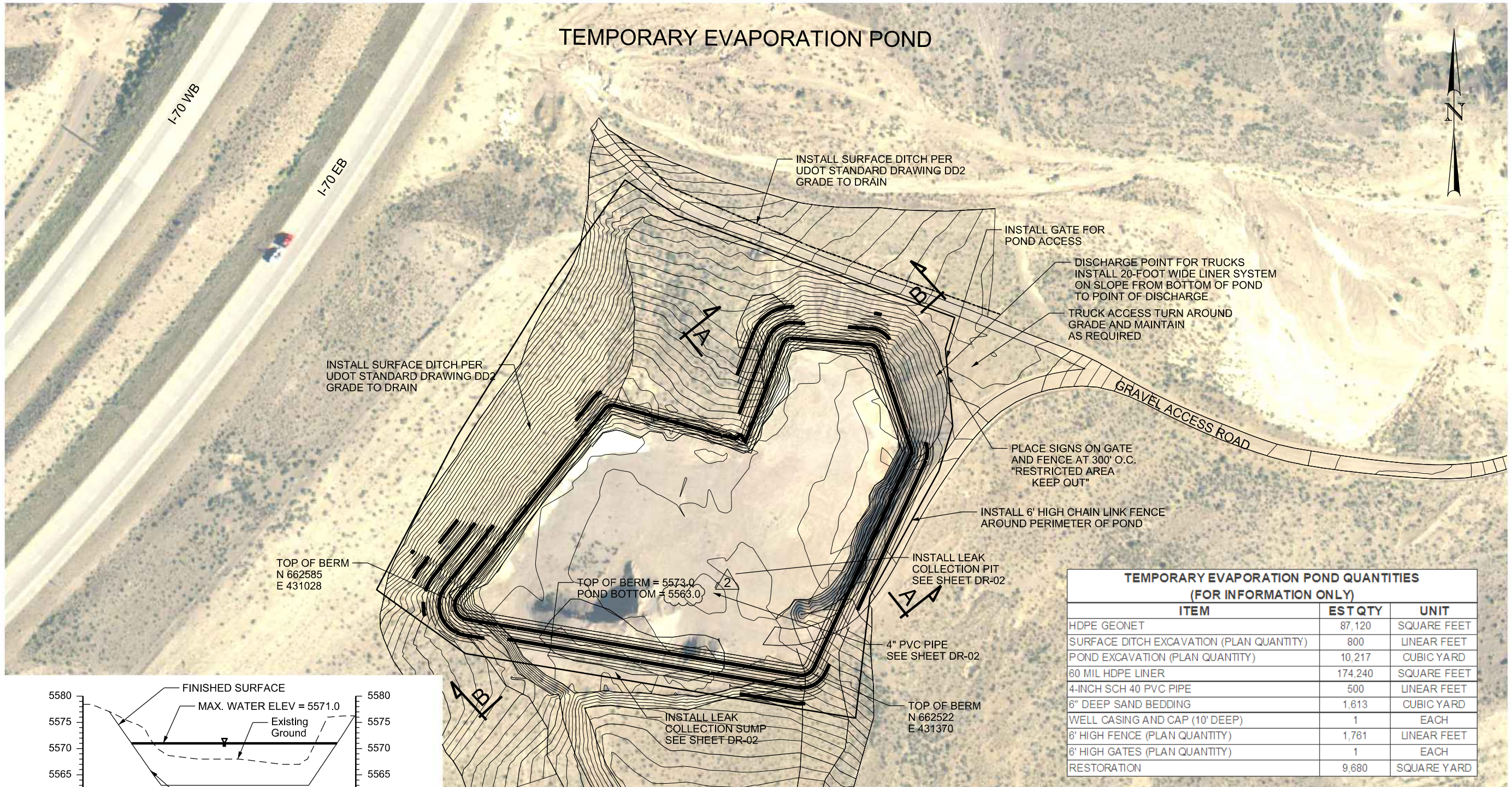
B. Repair liner in accordance with written manufacturer's instructions.

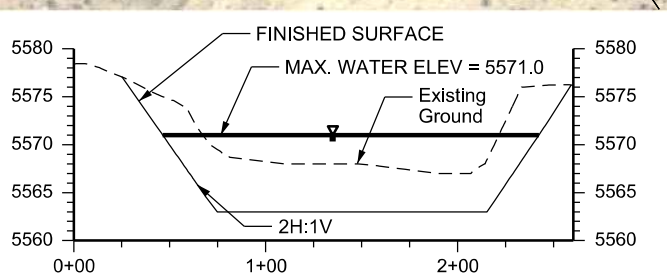
C. QA/QC Documentation:

1. Maintain a current copy of all QA/QC drawings and logs in the Contractor's field office at all times.
   a. Shop fabrication records, including lot numbers and location of all materials incorporated into each panel, seam inspection logs, repair logs with repair location(s), and any other shop QA/QC data available.
   b. QA/QC Field Drawings: Maintain one set of panel placement drawings identifying all prefabricated panel locations. These drawings shall also be used to locate test locations, seam failures, repair locations, etc., noted during QA/QC procedures.
   c. Panel Placement Log: This document identifies panel number, date deployed, panel area, and any remarks concerning placement.
   d. Destructive Seam Testing Summary: This document identifies sample number, lab or field test, location, date seam completed, seaming technician's ID, and test data results.
   e. Repair Summary: This document identifies repair number, location, failure type, date of repair, repair type, repair test data, QA/QC technician's ID.
   f. Daily Logs: Record weather data, number of personnel working, activity report, and record of unusual events.
2. Submit to the Engineer copies of all QA/QC documentation.

END OF SECTION

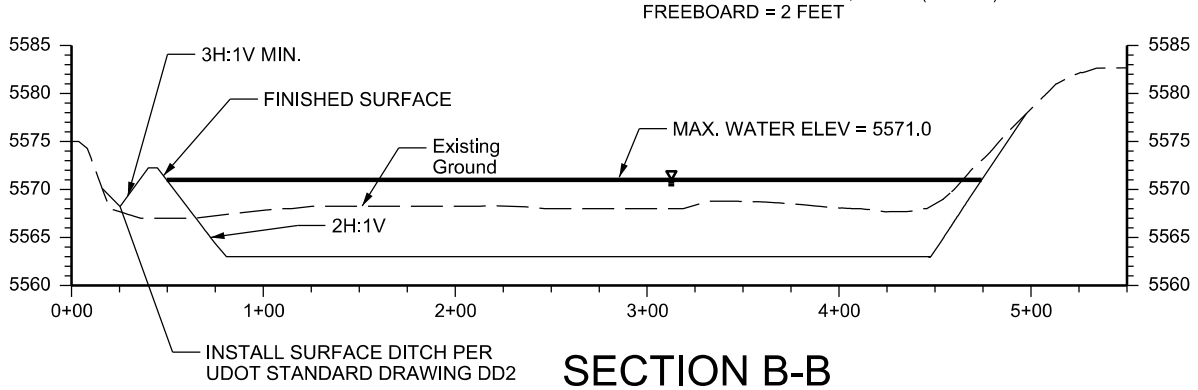
TEMPORARY EVAPORATION POND





SECTION A-A

WATER SURFACE AREA= 2.14 ACRES
POND DEPTH = 8 FEET WITH 2:1 INSIDE SIDE SLOPES
POND CAPACITY = 557,575 CF (12.8 AF)
FREEBOARD = 2 FEET



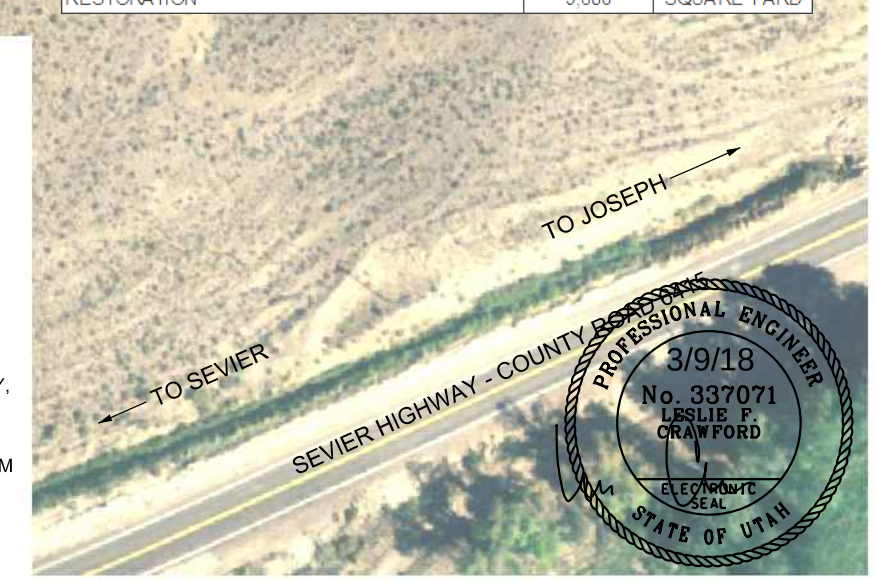
SECTION B-B

NOTES:

1. REFER TO SHEET DR-02 FOR NOTES AND DETAILS.
2. EVALUATE POND SIZE, DEPTH AND LOCATION BEFORE CONSTRUCTION BEGINS AND ALTER DESIGN, IF NECESSARY, TO MEET ANTICIPATED HYDRO-DEMOLITION PRODUCTION RATES.
3. ANY NEW DESIGN OF THE POND WILL NEED APPROVAL FROM THE UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY.
4. GRADE POND BOTTOM TO DRAIN TO LEAK COLLECTION PIT.

TEMPORARY EVAPORATION POND QUANTITIES (FOR INFORMATION ONLY)

ITEM	EST QTY	UNIT
HDPE GEONET	87,120	SQUARE FEET
SURFACE DITCH EXCAVATION (PLAN QUANTITY)	800	LINEAR FEET
POND EXCAVATION (PLAN QUANTITY)	10,217	CUBIC YARD
60 MIL HDPE LINER	174,240	SQUARE FEET
4-INCH SCH 40 PVC PIPE	500	LINEAR FEET
6" DEEP SAND BEDDING	1,613	CUBIC YARD
WELL CASING AND CAP (10' DEEP)	1	EACH
6' HIGH FENCE (PLAN QUANTITY)	1,761	LINEAR FEET
6' HIGH GATES (PLAN QUANTITY)	1	EACH
RESTORATION	9,680	SQUARE YARD



REVISIONS

NO.	DATE	APPROVED BY	REMARKS
1			
2	XX/XX	XXX	REMARKS
3			
4			
5			
6			

UTAH DEPARTMENT OF TRANSPORTATION
WILSON & COMPANY

APPROVED

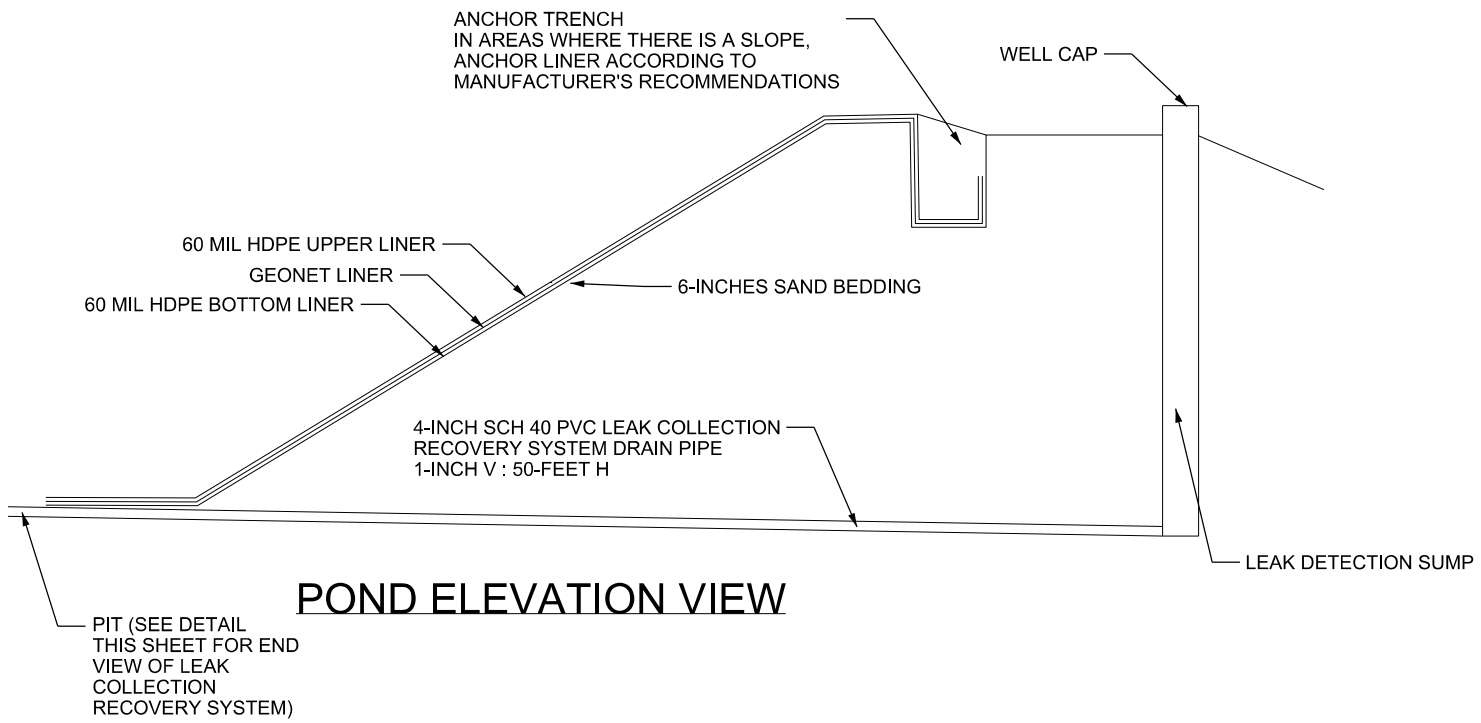
PROFESSIONAL ENGINEER

DRAWN BY LFC
QC CHECKED BY XXX
DATE

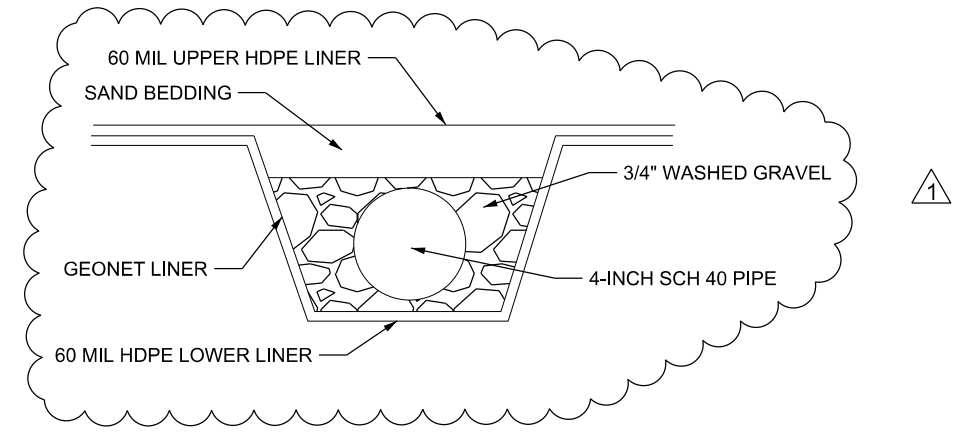
PROJECT: I-70; MP 7 to 21 BRIDGE PRESERVATION
TEMPORARY EVAPORATION POND
PROJECT NUMBER: F-I70-1(90)7
PIN 13804
DRAINAGE

SHEET NO. DR-01

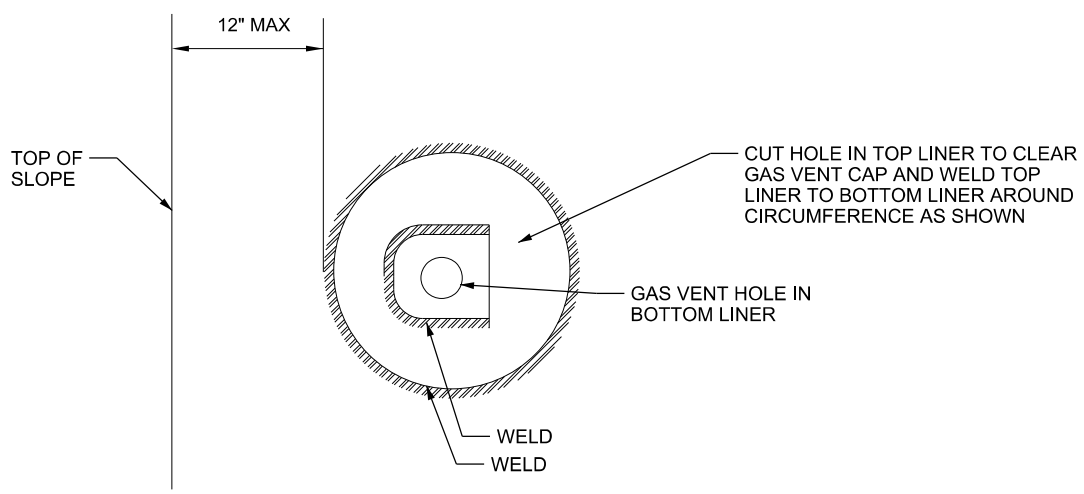
pw:\\wils-pwbentley.com:wils-pw\Documents\8100-TRN\UDOT\17-109-846-00_UDOT I-70,MP7 to 18 Bridge Preservation\drawing files\13884-DR-01
3/9/2018

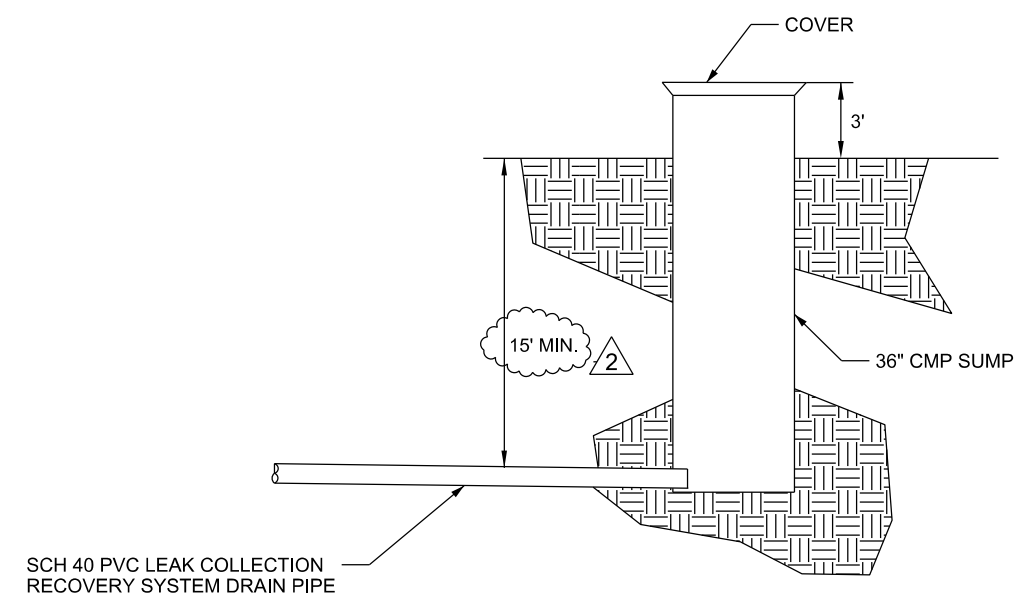


POND ELEVATION VIEW

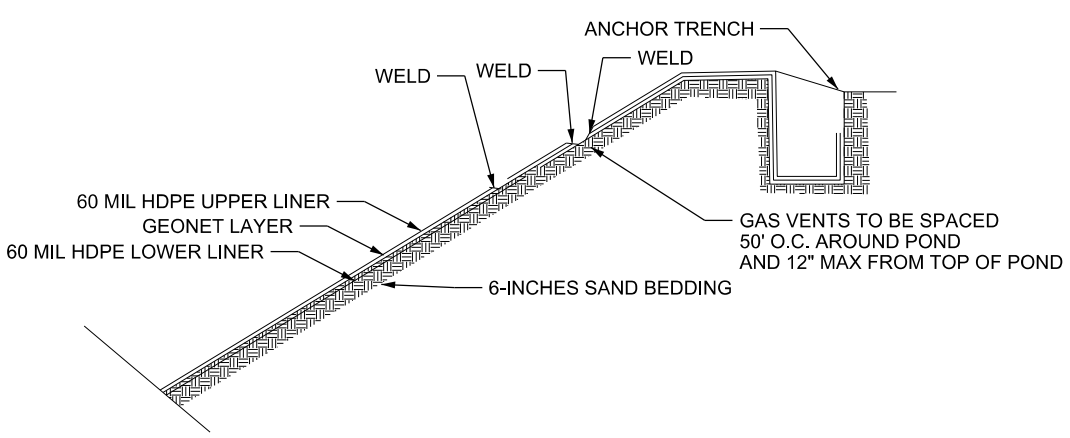


POND LEAK COLLECTION PIT

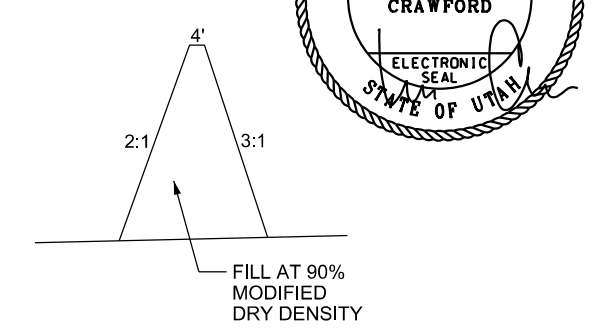




LEAK DETECTION SUMP



DOUBLE LINER GAS VENT



EMBANKMENT DETAIL

PROFESSIONAL ENGINEER
03/09/18
No. 337071
LESLIE F. CRAWFORD
ELECTRONIC SEAL
STATE OF UTAH

NOTES:

1. SITE IS LOCATED BETWEEN MILEPOSTS 24 AND 25 ON THE EAST SIDE OF INTERSTATE 70. ACCESS IS FROM SEVIER HIGHWAY - COUNTY ROAD 6415. PROPERTY IS OWNED AND MAINTAINED BY UDOT.

REVISIONS

NO.	DATE	REMARKS
6		
5		
4		
3	03/08/18	Detail Change
2	02/28/18	DETAIL CHANGE
1		

APPROVED BY: LFC

DRAWN BY: LFC

CHECKED BY: JPA

DATE

PROFESSIONAL ENGINEER

UTAH DEPARTMENT OF TRANSPORTATION
WILSON & COMPANY

PROJECT: I-70; MP 7 to 21 BRIDGE PRESERVATION
TEMPORARY EVAPORATION POND DETAILS

PROJECT NUMBER: F-I70-1(90)7 PIN 13804

DRAINAGE

SHEET NO. DR-02

COMP. I-70 EVAPORATION POND
CK.
DATE 2/20/18

WILSON & COMPANY

LOC. FILE
PROJ. SHEET 1
SUBJ. OF 2

ACTION LEAKAGE RATE CALCULATION
- QIBAL METHOD

$$Q = C_B a \sqrt{2 g h_w}$$

where

Q = leakage through a geomembrane defect

C_B = dimensionless coefficient - 0.6

a = area of geomembrane defect

g = acceleration of gravity = 9.81 m/sec^2 (32.2 ft/sec^2)

h_w = head of water on defect

$ALR = NQ$

where N = number of defects representing substandard performance

From Giroud and Bonaparte (1989), diameter of defect = 2 mm

$a = 0.0314\ cm^2 = 3.14 \times 10^{-6}\ m^2$

h_w = 8 feet = 2.44 meters

$$Q = (0.6)(3.14 \times 10^{-6}\ m^2)\sqrt{2(9.81\ \tfrac{m}{sec^2})(2.44\ m)}$$

$$= (0.6)(3.14 \times 10^{-6}\ m^2)(6.92\ \tfrac{m}{sec})$$

$$Q = 1.3 \times 10^{-5}\ \frac{m^3}{sec} = 4.6 \times 10^{-4}\ \frac{ft^3}{sec}$$

Find N, number of defects

Assume fair installation quantity and average number of defects

From Jordan et al (attached),

Assume N = 2 defects / acre

COMP. I-70 EVAPORATION POND

CK.

DATE 2/28/18

WILSON & COMPANY

LOC. FILE

PROJ. SHEET 2

SUBJ. OF 2

This is 2 defects per acre for a 2-acre pond

This corresponds to a "good" installation quality

$$ALR = N \cdot Q = 4\,(4.6 \times 10^{-4}\ ft^3/sec)$$

$$= 0.00184\ ft^3/sec$$

$$ALR = 0.83\ gal/min$$