

DETERMINATION OF NON-SIGNIFICANCE

Proponent: Yelm Community Schools

Description of Proposal: Resurface Football Field

Location of the Proposal: 1315 Yelm Avenue West and Tornadoc Alley, Yelm, WA.

Section/Township/Range: Section 24, Township 17 North Range 1 East, W.M.

Threshold Determination: The City of Yelm as lead agency for this action has determined that this proposal does not have a probable significant adverse impact on the environment. Therefore, an environmental impact statement (EIS) will not be required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

Mitigating Measures: None

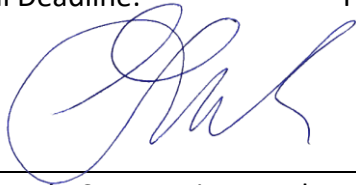
Lead agency: City of Yelm

Responsible Official: Grant Beck, Community Development Director

Date of Issue: February 27, 2019

Comment Deadline: March 13, 2019

Appeal Deadline: There is no local administrative appeal of a DNS



Grant Beck, Community Development Director

This Determination of Non-Significance (DNS) is issued pursuant to Washington Administrative Code 197-11-340 (2). Comments must be submitted to Grant Beck, Community Development Department, at City of Yelm, 105 Yelm Avenue West, Yelm, WA 98597, by October 8, 2018, at 5:00 P.M. The City of Yelm will not act on this proposal prior October 8, 2018 at 5:00 P.M.

DO NOT PUBLISH BELOW THIS LINE

Published: Nisqually Valley News, Friday, March 1, 2019
Posted in public areas: Wednesday, February 27, 2019

Copies to: All agencies/citizens on SEPA mailing list
Dept. of Ecology w/checklist

SEPA ENVIRONMENTAL CHECKLIST

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals: [\[help\]](#)

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the [SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS \(part D\)](#). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead agency may exclude (for non-projects) questions in Part B - Environmental Elements –that do not contribute meaningfully to the analysis of the proposal.

CITY OF YELM

Environmental Checklist

CITY USE ONLY

FEE: \$150.00

DATE REC'D _____

BY: _____

File No. _____

A. Background

1. Name of proposed project, if applicable: **Yelm High School Alternate Access Road Project**
2. Name of applicant: **Yelm Community Schools**
3. Address and phone number of applicant and contact person: **Attn: Chris Hansen, Facilities Director., Ph. 360.458.6128, P.O. Box 476, Yelm, WA 98597**
4. Date checklist prepared: **12/20/18**
5. Agency requesting checklist: **City of Yelm**
6. Proposed timing or schedule (including phasing, if applicable): **Construction will commence in May, 2019 and will be complete in thesecond week of August, 2019.**
7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. **No future activity is expected for the Yelm Stadium Field; it will remain a sports field. The long range plan for the Disposal property is for a sports field.**
8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. **No environmental information is needed for this Yelm Stadium Field as any impacts have already been incurred. The Disposal site contains Prairie Soils and was reviewed for Prairie Species, including the Mazama Pocket Gopher. Key Environmental Solutions (KES) reviewed WDFW PHS Species on December 31, 2016, September 15, 2017 and October 30, 2017 and no PHS species were found on or immediately adjacent to the parcels. Across SR 510 to the NE Mazama Pocket Gophers have been found according to WDFW. At this time a Habitat Management Plan (HMP) is not needed for the Yelm SD Alternate Access Road phase of the project.**

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. **No.**

10. List any government approvals or permits that will be needed for your proposal, if known.
City of Yelm grade and fill permit.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) **The intended use of the project is to increase the versatility and competitive quality of the Yelm Stadium Field by converting the natural grass field to synthetic turf and installing LED sportslighting.. The Yelm Stadium Field's disturbed area and the area to receive synthetic turf and track events total 84,460+/- square feet. The Disposal site disturbed area to receive fill totals 48,000+/- square feet.**

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. **Please see submitted plan set.**

Sec. 24, T 17 N, R,1E

Abbreviated Legal: 24-17-1E 17.83A E2 SE NW LESS 2.17A

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site:

(circle one): Flat, rolling, hilly, steep slopes, mountainous, other _____

b. What is the steepest slope on the site (approximate percent slope)? **1.25%**

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. **Nisqually loamy find sand, 3-15% slopes (#74), Spanaway Stony sandy loam, 0-3% slopes (#111), Spanaway stony sandy loam, 3-15% slopes (#112), and Spanaway gravelly sandy loam, 0-3% slopes (#110)**

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. **No**

e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill.

Removal of the existing field soil is to facilitate the installation of permeable aggregate required to accommodate positive drainage. Cut volumes to be hauled from the existing field and graded at the Disposal site totals 48,000+/- square feet and totals 3000+/- cubic yards. Permeable aggregate from a approved quarry site and to be backfilled into the Field totals 2000+/- cubic yards.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
No

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Total = 42 Acres

Impervious = 28 Acres 66.67%

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:
Implement Best Management Practices will be followed during construction.

2. Air

a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed? If any, generally describe and give approximate quantities if known. **Typical construction emissions.**

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. **N/A**

c. Proposed measures to reduce or control emissions or other impacts to air, if any:
Implementation of Best Management Practices will be followed during construction.

3. Water

a. Surface Water:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

There is a drainage course approximately 1200 feet west of the project location.

**Extremely
sensitive
aquifer**

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans. **No**

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material. **N/A**

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known. **No**

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. **No**

b. Ground Water:

1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. **N/A**

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. **N/A**

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe. **It is not anticipated that there would be any runoff coming from this site. The intent is to infiltrate 100 percent of the runoff from the proposed improvements.**

2) Could waste materials enter ground or surface waters? If so, generally describe. **No**

3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe. **No**

d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any: **No measures will be taken at the Yelm Stadium Field site as the entire project is paved and higher in elevation than the field. Erosion control measures such as Silt Fence will be deployed at the Disposal site.**

4. Plants

a. Check the types of vegetation found on the site (both Yelm Stadium Field and the Disposal site):

☒ deciduous tree: alder, maple, aspen, other

☒ evergreen tree: fir, cedar, pine, other

☒ shrubs

☒ grass

☒ pasture

☐ crop or grain

☐ Orchards, vineyards or other permanent crops.

☐ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other

___water plants: water lily, eelgrass, milfoil, other
___X___other types of vegetation Scotch Broom

- b. What kind and amount of vegetation will be removed or altered?

All vegetation will be removed in the footprint of the proposed field and Disposal site.. Dominant vegetation to be removed will be turfgrass, Scotch broom, orchard grass, tall oat-grass Common Velvetgrass colonial bentgrass Himalayan blackberry, black hawthorn, thistle, common dandelion, Hairy's Cat ear, Hazelnut, snowberry, and moss.

- c. List threatened and endangered species known to be on or near the site.

1, Common Name: Mazama (Western) Pocket Gopher

Scientific Name: *Thomomys Mazama*

Federal Status: Threatened

State Status: Threatened

Found near project site: 770', 0.15 miles to the NE across SR 510 and 1175', .37 miles to the NW across field and 93rd Ave

Mounds were found onsite at the Disposal site during both site visits, but they were old and weathered. No fresh mounds were observed except several mole mounds.

2. Common name: Streaked Horned Lark

Scientific Name: *Eremophila alpestris strigata*

Federal Status: Threatened

State Status: Endangered

No known locations were found near the project vicinity (WDFW, PHS October 2017).

3. Common Name: Taylor's Checkerspot Butterfly

Scientific Name: *Euphydryas editha taylori*

Federal Status: Endangered

State Status: Endangered

No known locations were found near the project vicinity (WDFW, PHS October 2017).

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: **None are proposed at this time other than to hydroseed disturbed areas at the Disposal site with meadow grass.**

- e. List all noxious weeds and invasive species known to be on or near the site.

Himalayan Blackberry, Scotch Broom

No
evidence of
gopher
pursuant to
Key
Solutions.

5. Animals

- a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site.

Examples include:

birds: hawk, heron, eagle, songbirds, other:
mammals: deer, bear, elk, beaver, other: coyote, voles, moles
fish: bass, salmon, trout, herring, shellfish, other _____

- b. List any threatened and endangered species known to be on or near the site.

Didn't see any but Golden Indian Paintbrush (*Castilleja levisecta*) has been found in the Yelm area.

- c. Is the site part of a migration route? If so, explain.

No

- d. Proposed measures to preserve or enhance wildlife, if any: **None proposed at this time.**

- e. List any invasive animal species known to be on or near the site.

N/A

6. Energy and Natural Resources

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electric energy will be used to power the athletic field lighting system and scoreboard.

- b. Would your project affect the potential use of solar energy by adjacent properties?
If so, generally describe. **No**

- c. What kinds of energy conservation features are included in the plans of this proposal?
List other proposed measures to reduce or control energy impacts, if any:

The athletic field lighting system utilizes energy-efficient LED lamps, which will reduce the energy consumed by the current field lighting system by approximately 80%.

7. Environmental Health

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal?
If so, describe.

- 1) Describe any known or possible contamination at the site from present or past uses.
None known.

- 2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity. **None anticipated.**

- 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project. Hazardous chemicals will not be allowed to be stored on-site during construction. **None anticipated for the life of the project.**
- 4) Describe special emergency services that might be required. **Fire and Life Safety and Law Enforcement could be notified during an emergency event.**
- 5) Proposed measures to reduce or control environmental health hazards, if any: Employ BMP's in accordance with the proposed improvements. **Contractor to have spill containment materials on-hand in the case of a minor fuel or oil spills.**

b. Noise

- 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? **During construction there will be noise generated from machinery. Post construction there will be pedestrian and vehicular traffic.**
- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site. **During the construction phase noise levels will be elevated due to the types of machinery employed to construct the improvements. Vibratory Compaction Equipment and banging of dump truck beds will have periods of intermittent elevated sounds. After construction there will be normal passenger vehicle traffic noises. Normal hours of operation will be consistent with school schedules and activities.**
- 3) Proposed measures to reduce or control noise impacts, if any: **During construction limit the contractors hours of operation will be Mon. – Fri. 6:00 am to 5:00 pm. After construction vehicle noise will be mostly during school operating hours and special school events.**

Extremely
sensitive
aquifer

8. Land and Shoreline Use

- a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe. **There are residential neighborhoods on the south and west sides of the project, and commercial properties to the east of the project.**
 - b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? **No, this site is currently a high school sports field and will remain a sports field after project completion.**
- 1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how: **The project is not anticipated to impact adjacent properties or the uses of those properties.**

Existing
school site
is zoned
Institutional.
Yelm
Community
schools
owns all
property
under this
permit
request,
and all uses
are
reviewed
approved.

- c. Describe any structures on the site. **Yelm High School and all of its associated structures are present on site and will not be expanded or modified in any manner whatsoever.**
- d. Will any structures be demolished? If so, what? **No**
- e. What is the current zoning classification of the site? **R-4 Residential and R-14**
- f. What is the current comprehensive plan designation of the site? **Split between High Density Residential and Low Density Residential**
- g. If applicable, what is the current shoreline master program designation of the site? **N/A**
- h. Has any part of the site been classified as a critical area by the city or county? If so, specify. **No, with the exception that the parcels have prairie soils.**
- i. Approximately how many people would reside or work in the completed project? **None**
- j. Approximately how many people would the completed project displace? **Zero**
- k. Proposed measures to avoid or reduce displacement impacts, if any: **N/A**
- l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: **No measures are proposed because this project is simply a change of sport field surfacing from natural grass to synthetic turf. No modification of Land-use are proposed.**
- m. Proposed measures to reduce or control impacts to agricultural and forest lands of long-term commercial significance, if any: **None proposed.**

See response
at 8a

9. Housing

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. **N/A**
- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. **N/A**
- c. Proposed measures to reduce or control housing impacts, if any: **N/A**

10. Aesthetics

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? **No structures are proposed.**
- b. What views in the immediate vicinity would be altered or obstructed? **None**

- d. Proposed measures to reduce or control aesthetic impacts, if any: **Removal and clearing to be contained in the areas designated on the contract documents.**

11. Light and Glare

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

The proposed athletic field lighting system replaces an existing athletic field lighting system with new LED fixtures and equipment that have the most current spill and glare control available in athletic field illumination. While light and glare will be produced by the new system, current levels of light and glare will be greatly reduced. LED lamps utilize approximately 20% of the energy used to power HID or Metal-Halide lamps currently used in most athletic field lighting systems.

The field lighting system is designed to minimize the amount of light and glare generated with Shielded and Aimable Lumenaires, and meets the criteria of the Dark Sky Society Outdoor Lighting Handbook and their Guidelines for Outdoor Athletic Field Lighting. The type of glare generated will be direct glare associated with the floodlight lamps and reflectors and reflected glare.

Time of day will be between the hours of 5:30 pm and 10:00 pm, depending upon the time of year and type of scheduled event.

- b. Could light or glare from the finished project be a safety hazard or interfere with views? **No**
- c. What existing off-site sources of light or glare may affect your proposal? **N/A**
- d. Proposed measures to reduce or control light and glare impacts, if any:

The floodlights used for the athletic field lighting system are specifically designed to reduce light and glare impacts. The floodlights incorporate the largest available external visors available typically used for athletic field lighting. The floodlights are high efficiency floodlights with specially designed reflectors that direct the vast majority of the light down onto the playing field and not up into the atmosphere. The system will use proper mounting heights to aim the lights down on to the field minimizing spill light generated beyond the playing field. The large visors reduce the visibility of the floodlight lamps and reflectors from off-site locations dramatically reducing glare. Negligible spill light will be generated off site from the athletic field lighting system.

12. Recreation

- a. What designated and informal recreational opportunities are in the immediate vicinity? **City Parks.**
- b. Would the proposed project displace any existing recreational uses? If so, describe. **No**
- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: **None**

13. Historic and cultural preservation

- a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers ? If so, specifically describe. **N/A**
- b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. **None known.**
- c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. **N/A**
- d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required. **N/A**

14. Transportation

- a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any.

Yelm Highway and Tornado Alley

- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? **Approximately 2000 feet east of the project at the intersection of Tahoma Blvd. and Yelm Ave.**
- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate? **N/A**
- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private). **No**
- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. **No**
- f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles). What data or transportation models were used to make these estimates? **Whereas this project is simply a change in sports field surfacing, the use of this facility will not be altered.**
- g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe. **No.**
- h. Proposed measures to reduce or control transportation impacts, if any: **None proposed.**

15. Public Services

- a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe. **No**
- b. Proposed measures to reduce or control direct impacts on public services, if any. **None anticipated.**

16. Utilities

- a. Circle utilities currently available at the site:
electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system,
other Reclaim Water; **all of these utilities are available to the site and no modifications will occur to these utilities as a result of this project.**
- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. **None**

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: _____



Name of signee _Bob Droll, ASLA_____

Position and Agency/Organization: Robert W. Droll, Landscape Architect, PS representing
Yelm Community Schools

Date Submitted: _____1//30/19_____

D. supplemental sheet for nonproject actions [\[help\]](#)

(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.



Technical Memorandum

Date 01/14/2019
To: RWDroll
Cc:
From: Robert E. Holcomb, PE
RE: Yelm High School Stadium Field Conversion
Stormwater Improvements

1.0 Introduction

This technical memo summarizes the proposed stormwater improvements necessary for upgrading the Yelm High School Conversion from a grass field to synthetic turf.

2.0. Existing Conditions

The existing stadium field consists of grass turf surrounded by a rubberized track. Review of the topographic survey (DWG 2.0 attached) and the original drainage and utilities plan (DWG D1.5 attached) provided by the owner shows that there are several catch basins located around the perimeter of the field adjacent to the rubberized track. In the interior of the field there are underdrain pipes located 20-feet apart running from the center of the field north and south to a collector pipe that connects the underdrains to the catch basins. The the system discharges to four (4) dry wells located outside of the rubberized track for infiltration into the ground.

3.0. Geotechnical Investigation

In November 2018, Landau Associates, INC. (LAI) performed subsurface exploration at six (6) locations within the existing football field. They determined that the infiltration rates at the edge on the football field to be in the range of 0.58 in/hr to 3.35 in/hr. The infiltration results from LAI were considered in the design of the proposed stormwater improvements. A copy of the technical memo from LAI, dated November 28, 2018, is attached.

4.0 Proposed Improvements

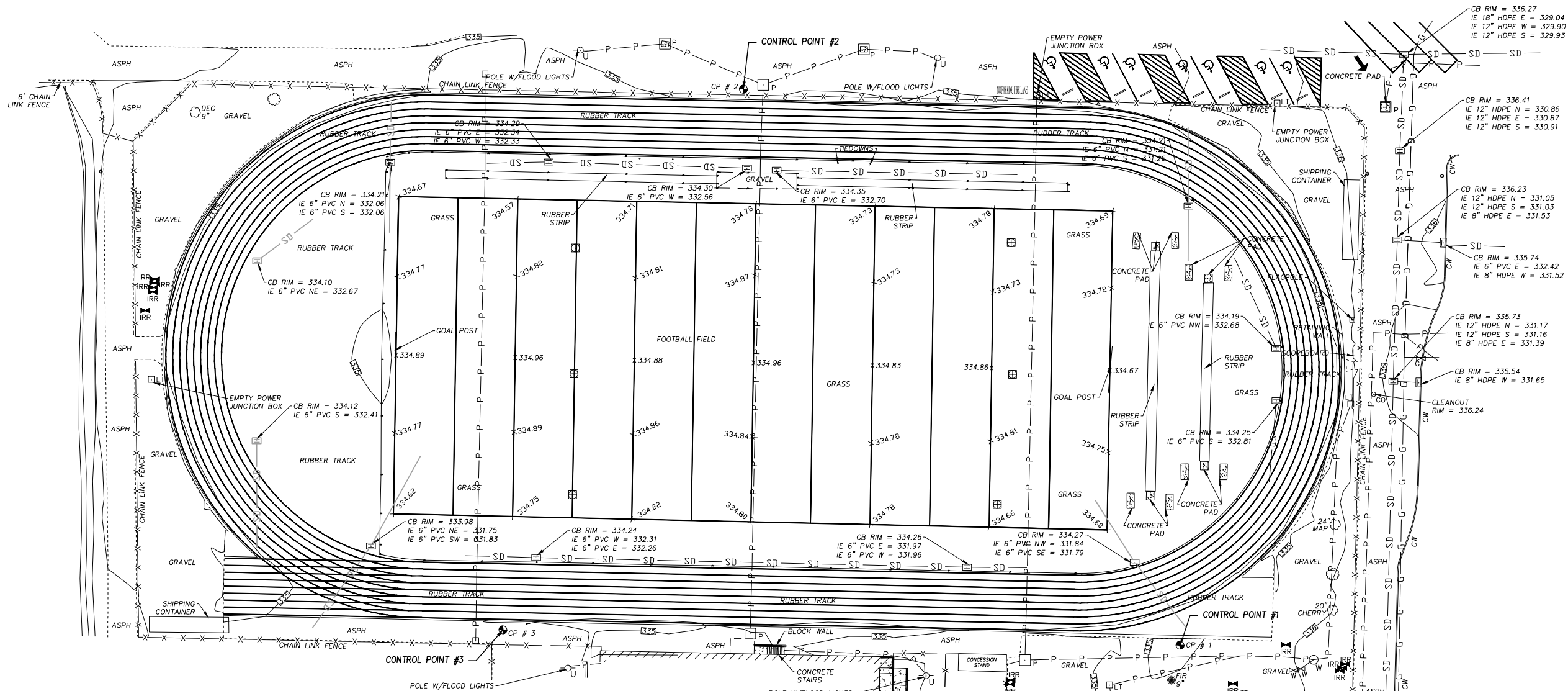
The proposed project will remove the existing grass turf and underdrain system, regrade the field to provide constant cross slope from the center of the field to the edge of the field, and install a new underdrain system (DWG C1.2 and DWGs C3.2 through C3.4 attached) for the site. Upon completion of the new underdrain system and regrading of the field, new synthetic turf will be installed.

The underdrain system consists of 12 perforated underdrain pipes placed 15-feet apart across the field. The pipes are placed under the field in an east to west direction. The underdrain pipes are 4-inch diameter perforated pipes placed a minimum of 1.5-feet below the surface of the synthetic turf in a 12-inch wide gravel trench. To collect the runoff from the proposed underdrain system and route it to the proposed infiltration trench, two (2) 94-foot long collector pipes will be installed across the field in a north to south direction 220-feet apart. The collection system consist of 6-inch diameter perforated drain pipes installed in a 18-inch wide gravel trench that varies in depth from 1.5-feet to 2.5-feet deep below the surface of the synthetic turf. At the end of the collector pipes, catch basins will be installed to connect the collection system to the infiltration trenches.

Two (2) infiltration trenches will be constructed at the edge of the field for infiltrating the collected runoff into the ground. The infiltration trenches consists of 220-feet of 10-inch diameter perforated pipe placed 4.16-feet below the surface of synthetic turf in an 18-inch wide gravel trench.

An overflow from the infiltration trench to the existing dry wells is provided in the event that the proposed infiltration trench is unable to accommodate a rainfall event. The overflow consists of 6-inch diameter perforated pipe connecting the ends of the infiltration trench to a new catch basin that has been installed on the existing overflow pipe to the dry wells.





BASIS OF MERIDIAN
ASSUMED

VERTICAL DATUM
ASSUMED

UTILITY NOTE
UTILITIES SHOWN HEREON ARE PER KPFF AS-BUILT OF SITE SURFACE FEATURES IN CONJUNCTION WITH UNDERGROUND UTILITY LOCATES PERFORMED BY KPFF. THIS SURVEY DOES NOT PURPORT TO LOCATE ALL SUBSURFACE UTILITIES. ALL UNDERGROUND UTILITIES SHOULD BE CONSIDERED APPROXIMATE ONLY AND LOCATIONS SHOULD BE VERIFIED PRIOR TO EXCAVATION.

BOUNDARY NOTE
NO BOUNDARY OR RIGHT OF WAY OR EASEMENT INFORMATION IS SHOWN HEREON. THIS SURVEY IS INTENDED TO MAP EXISTING SITE CONDITIONS, AND IN NO WAY REPORTS THE LOCATION OF BOUNDARY LINES ASSOCIATED WITH THE PROJECT.

METHOD OF SURVEY
CONTROL AND TOPGRAPHIC SURVEY PERFORMED USING TOPCON PS 103 TOTAL STATION.

THE WORK PERFORMED DURING THE COURSE OF THIS SURVEY MEETS OR EXCEEDS THE STANDARDS AS SET FORTH IN WAC 332-130-090. COMPLETED IN NOVEMBER OF 2018.

CONTROL POINT TABLE

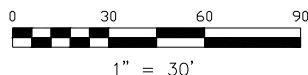
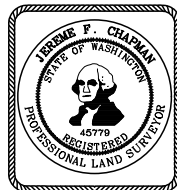
Point	Northing	Easting	Elevation	Description
1	596859.537	1109445.269	334.85	SET HUB AND MAG
2	597139.403	1109225.318	334.97	SET HUB AND MAG
3	596867.308	1109104.269	334.96	SET MAG

LEGEND

	SURVEY CONTROL POINT
	TEST HOLE
	POWER VAULT
	UTILITY POLE
	LIGHT JUNCTION BOX
	WATER MANHOLE
	FIRE HYDRANT
	WATER VALVE
	IRRIGATION VALVE
	GAS METER
	GAS VALVE
	SANITARY SEWER MANHOLE
	SANITARY SEWER CLEANOUT
	CATCH BASIN
	BOLLARD
	SIGN AS NOTED
	SHRUB
	BUSH
	CONIFER
	DECIDUOUS
	BUILDING OVERHANG
	FENCE AS NOTED
	EDGE OF PAVEMENT
	GAS
	WATER
	STORM
	UNDERGROUND POWER
	CONCRETE HATCH
	BUILDING HATCH

kpff

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Yelm High School Stadium Field Conversion

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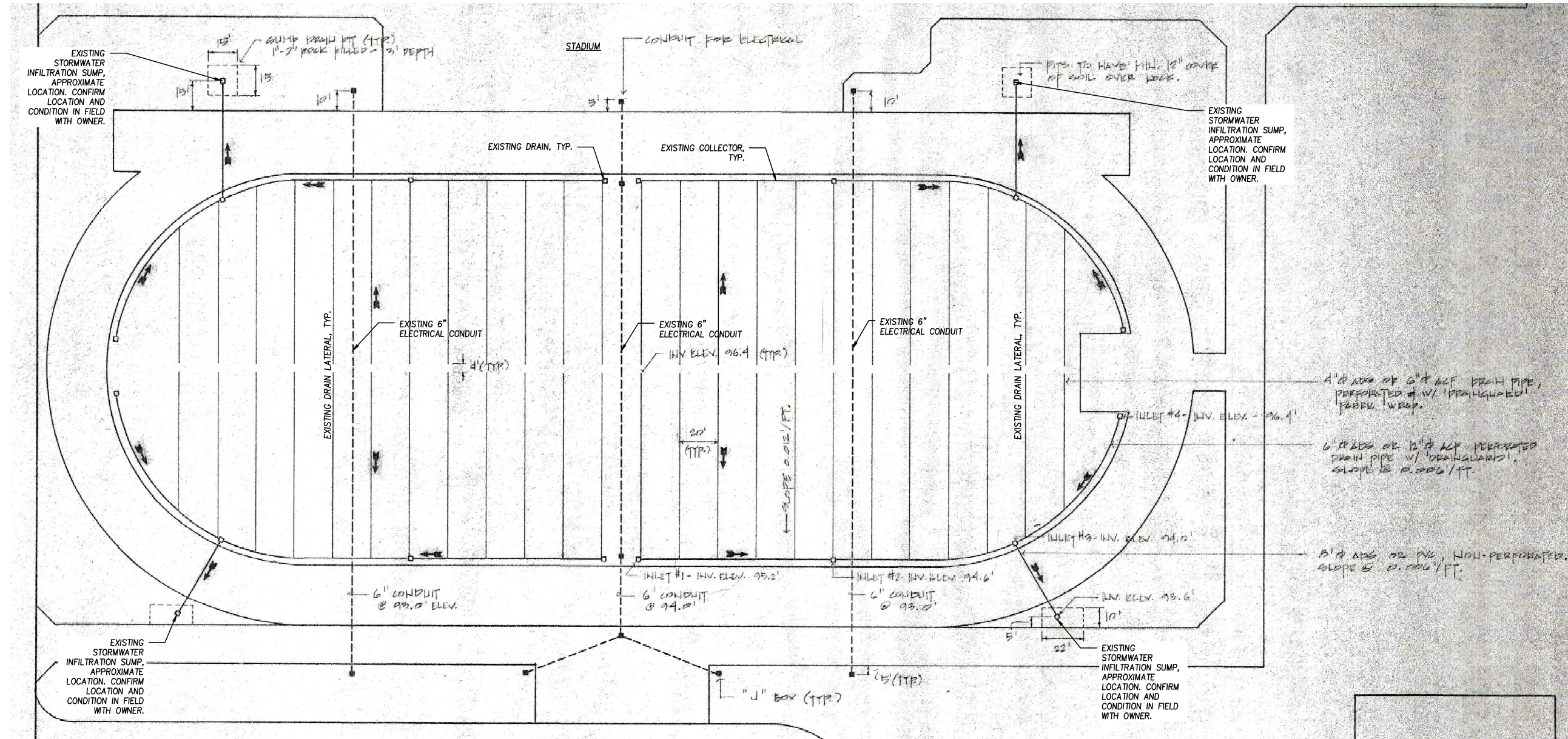
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DATE: JANUARY 7, 2019

Existing
Conditions

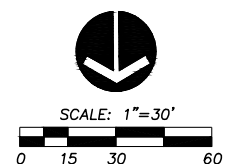
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Sheet - of -



Notes

1. THIS DRAWING WAS OBTAINED FROM OWNER ARCHIVES. IT IS PROVIDED FOR CONVENIENCE ONLY.
2. THE ACTUAL LOCATIONS OF ALL EXISTING FEATURES AND INFORMATION SHOWN HEREON MAY VARY FROM THE ACTUAL CONDITIONS ENCOUNTERED IN THE FIELD.
3. DO NOT USE THIS DRAWING FOR STAKING, LAYOUT, OR CONSTRUCTION OF PROPOSED ELEMENTS.



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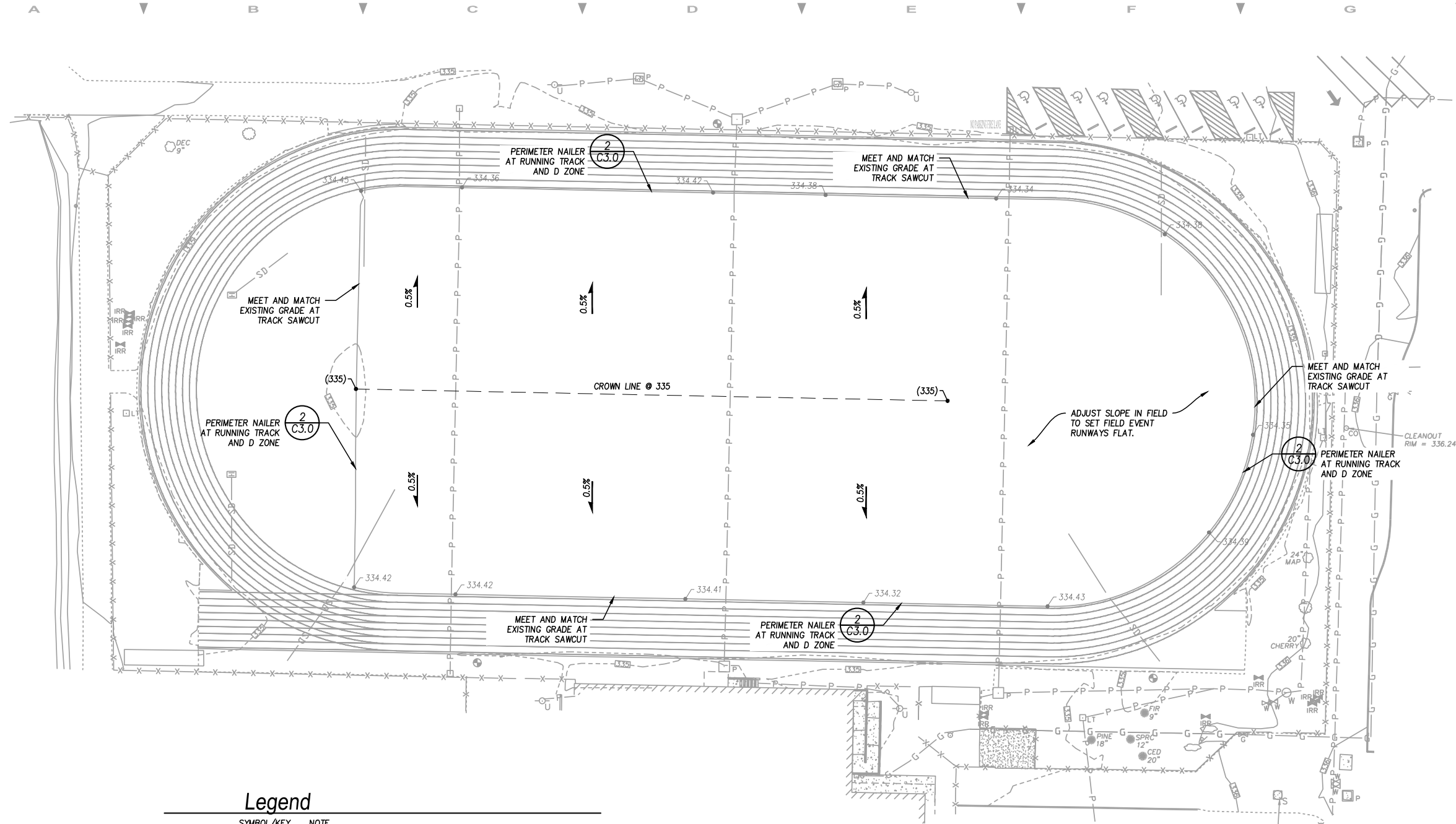
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DATE: JANUARY 7, 2019

Original Drainage
& Utilities Design
Plan

D1.5

Sheet - of -



Legend

SYMBOL/KEY	NOTE
xxx	EXISTING SPOT ELEVATION
(xxx)	PROPOSED SPOT ELEVATION

Yelm High School Stadium Field Conversion

Yelm High School
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DATE: JANUARY 7, 2019

Grading Plan

C1.1

Sheet - of -

811 Call 811
two business days
before you dig

SCALE: 1"=30'



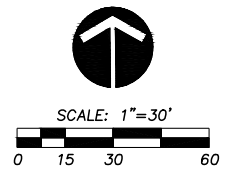
Demolition Legend

- SYMBOL/KEY NOTE
- 4" HDPE SLOTTED LATERAL DRAIN LINE
 - 6" HDPE SLOTTED COLLECTOR LINE
 - 10" HDPE SLOTTED COLLECTOR LINE
 - CB = CATCH BASIN
 - IE = INVERT ELEVATION

Storm Line Schedule		LENGTH PROVIDED FOR CONVENIENCE ONLY ACTUAL LENGTHS ARE TO BE TAKEN FROM PLAN			
LINE I.D.	SIZE DIA. (IN)	MATERIAL	LENGTH (FT)	SLOPE	REMARKS
A	6 IN.	SLOTTED HDPE	94 LF	1.0%	COLLECTOR
B	6 IN.	SLOTTED HDPE	94 LF	1.0%	COLLECTOR
C	6 IN.	SLOTTED HDPE	94 LF	1.0%	COLLECTOR
D	6 IN.	SLOTTED HDPE	94 LF	1.0%	COLLECTOR
E	10 IN.	SLOTTED HDPE	218 LF	0%	INFILTRATION GALLERY
F	10 IN.	SLOTTED HDPE	218 LF	0%	INFILTRATION GALLERY
G	6 IN.	SLOTTED HDPE	109 LF	0.5%	OUTFALL TO EX. SUMP DRAIN
H	6 IN.	SLOTTED HDPE	70 LF	0.5%	OUTFALL TO EX. SUMP DRAIN
I	6 IN.	SLOTTED HDPE	44 LF	0.5%	OUTFALL TO EX. SUMP DRAIN
J	6 IN.	SLOTTED HDPE	115 LF	0.5%	OUTFALL TO EX. SUMP DRAIN

Drainage Construction Notes

- COORDINATE WITH IRRIGATION INSTALLER TO ASSURE IRRIGATION PIPE AND MATERIALS DO NOT CONFLICT WITH FIELD DRAINAGE INSTALLATION.
- EXCAVATE TRENCH LINES TO GRADE, FREE OF HUMPS, HIGH POINTS, AND / OR LOW SPOTS.
- TRENCH SIDES AND BOTTOMS SHALL BE CLEAN, TRUE TO GRADE, AND FREE OF SURPLUS AND SLUFFED MATERIALS.
- REMOVE EXCAVATED MATERIAL AS TRENCHES ARE CONSTRUCTED. MATERIAL SHALL BE DISPOSED OF ON SITE IN DESIGNATED WASTE AREAS.
- ALL TRENCHES TO HAVE BACKFILL MATERIAL "CROWNED" A MINIMUM OF 2" ABOVE SUBGRADE TO PROTECT FROM FOREIGN MATERIAL AND PROVIDE FOR EASE OF LOCATION IDENTIFICATION. CROWNS SHALL BE REMOVED PRIOR TO PLACEMENT OF BASE COURSE.
- AFTER TRENCH EXCAVATION, ASSURE ALL TRENCH SPOILS ARE REMOVED AND SUBGRADE HAS BEEN RE-GRADED TO MEET SPECIFIED TOLERANCES.
- STABILIZE PIPE WHEN INSTALLING BACKFILL TO PREVENT DISPLACEMENT AND TO ASSURE SPECIFIED SLOPE AND INVERT IS ACHIEVED. DO NOT DAMAGE PIPE. REMOVE CROWNED BACKFILL AGGREGATE BEFORE COMMENCING BASE COURSE INSTALLATION.
- TEMPORARILY CAP ALL OPEN PIPE ENDS DURING CONSTRUCTION TO PREVENT CONTAMINATION.
- ONLY TRACKED VEHICLES SHALL BE ALLOWED TO DRIVE OVER THE TOP OF BACKFILLED TRENCHES. STAKE AND FLAG TRENCHES WITH RED-FLAGGED WOODEN SLATS (30 IN. MIN. HEIGHT) AT BOTH ENDS AND AT 50' SPACING FOR IDENTIFICATION.
- AT CONTRACTOR'S OPTION, INSTALL FIELD SUBDRAIN COLLECTORS, WITH CONNECTIONS FOR LATERALS ATTACHED, AT THE SAME TIME AS THE STORM DRAIN LINES, TO PREVENT ADDITIONAL EXCAVATION.
- QUANTITIES PROVIDED ARE FOR CONVENIENCE ONLY, ACTUAL QUANTITIES MAY VARY IN FIELD. CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING ALL MATERIALS, FITTINGS, AND LABOR REQUIRED FOR A COMPLETE, 100% OPERATIONAL SYSTEM, INSTALLED TO THE DIMENSIONS SHOWN HEREON.
- PIPE SLOPE AND INVERT ELEVATIONS ARE MINIMUM REQUIREMENTS. CONTRACTOR SHALL ADJUST IN FIELD TO PROVIDE POSITIVE DRAIN OF ALL LINES TO THE SPECIFIED OUTFALL.



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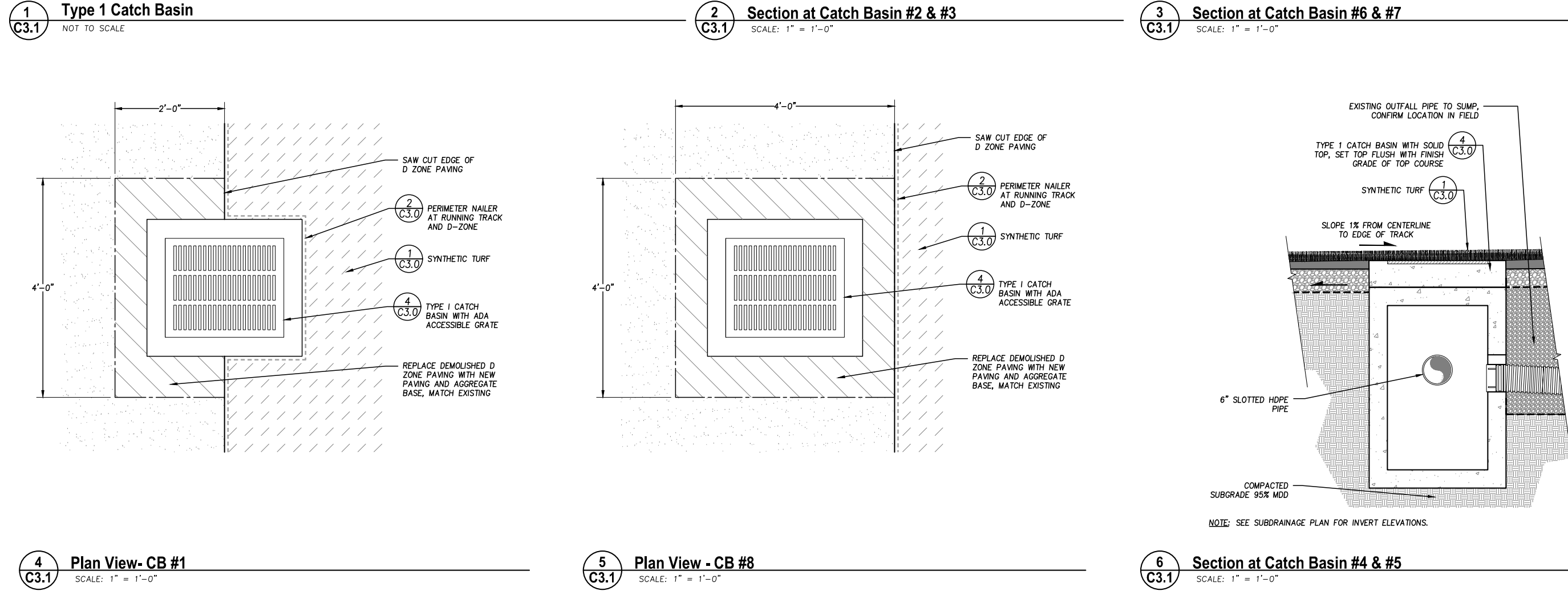
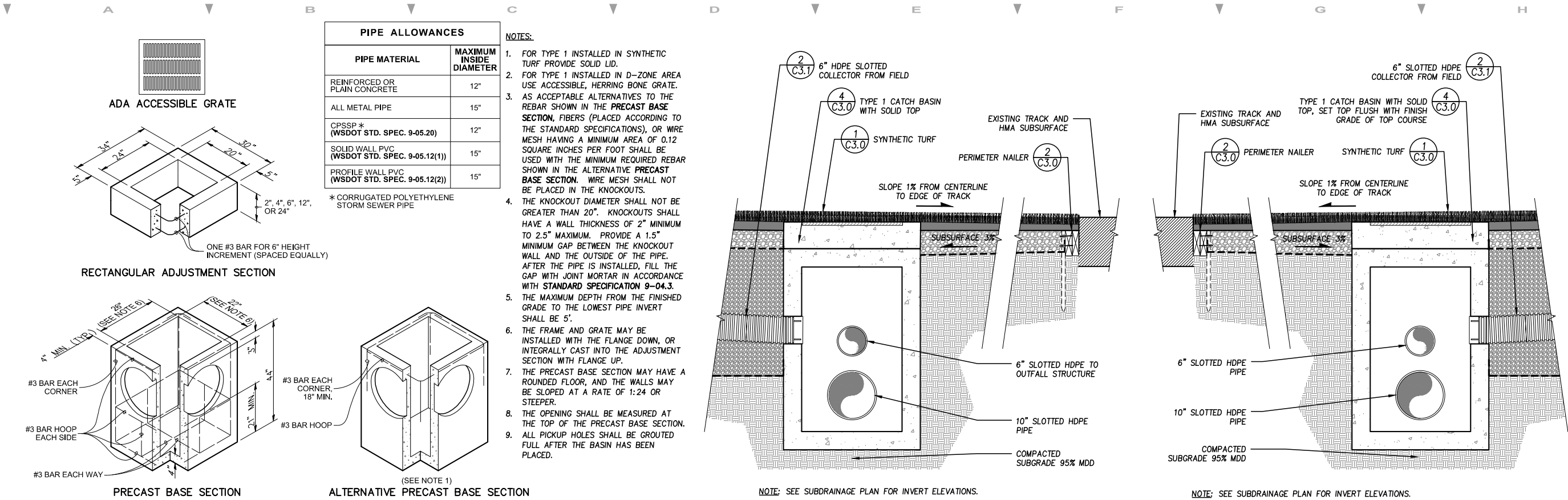
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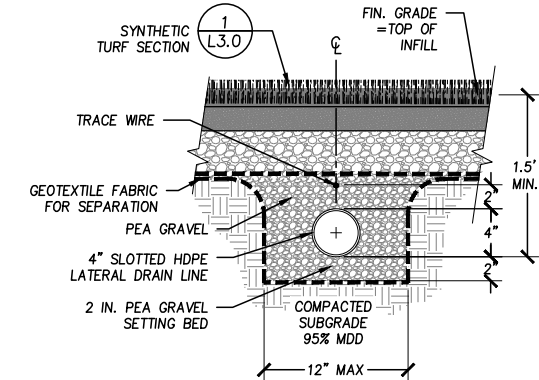
DATE: JANUARY 7, 2019

Subsurface
Drainage Plan

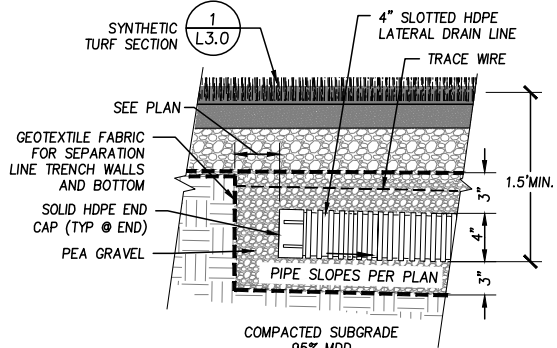
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Sheet - of -

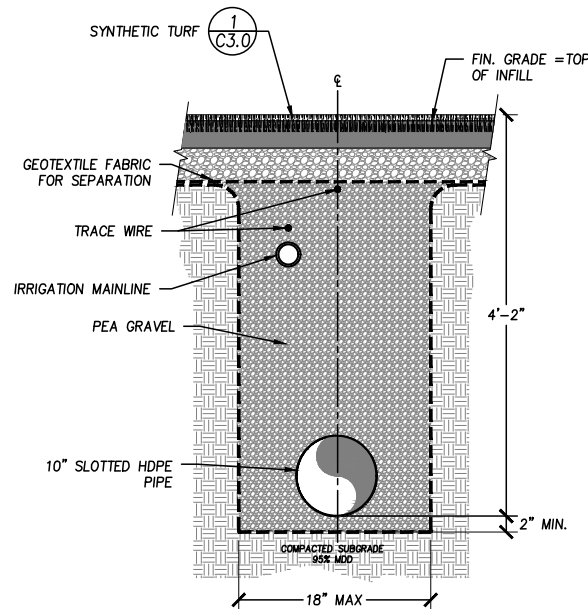




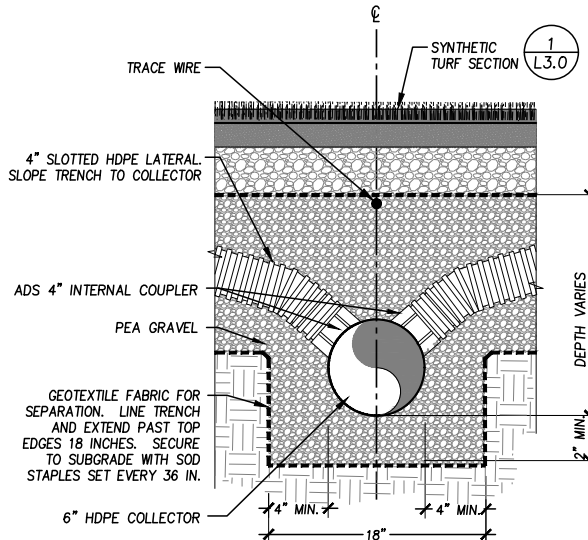
1 Typical Subdrain Lateral Section
C3.2 SCALE: 1" = 1'-0"



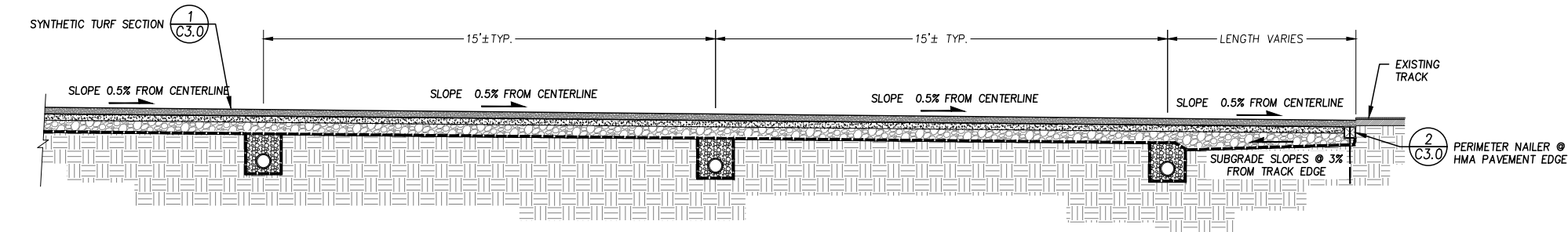
2 Subdrain Lateral at Upstream Pipe End
C3.2 SCALE: 1" = 1'-0"



3 Infiltration Gallery
C3.2 SCALE: 1" = 1'-0"



4 Subdrain Lateral Connection to Collector
C3.2 SCALE: 1 1/2" = 1'-0"



5 Field Cross Section
C3.2 NOT TO SCALE

Yelm High School Stadium Field Conversion

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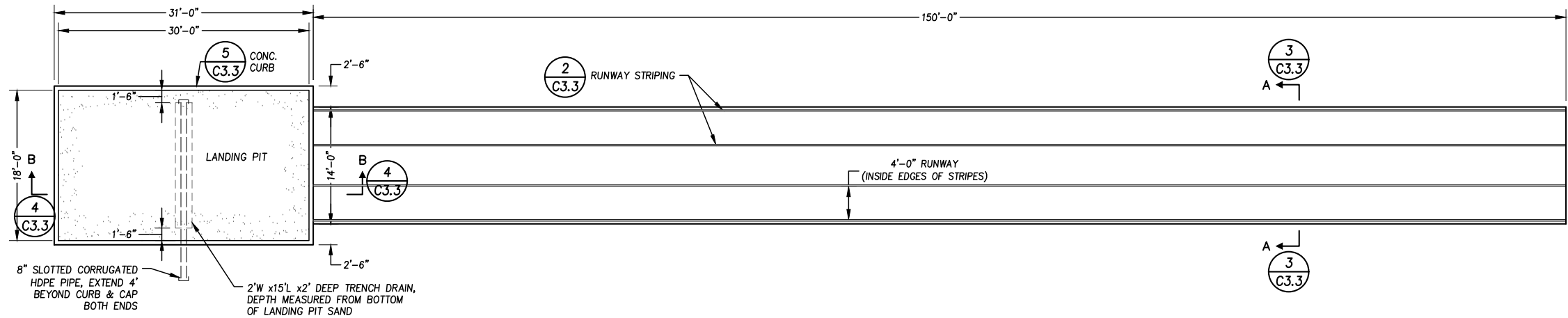
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DATE: JANUARY 7, 2019

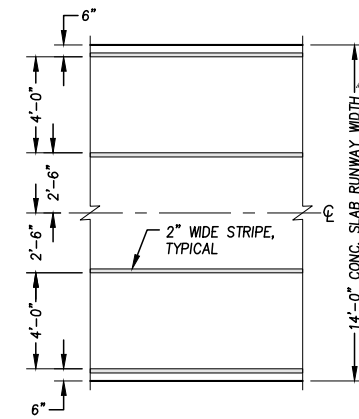
Site Details

C3.2

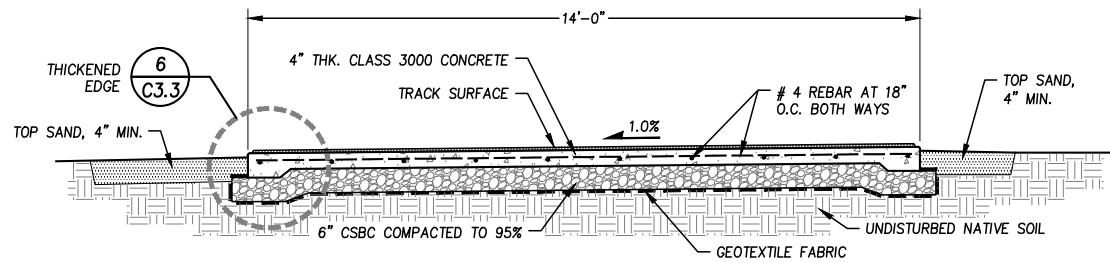
Sheet - of -



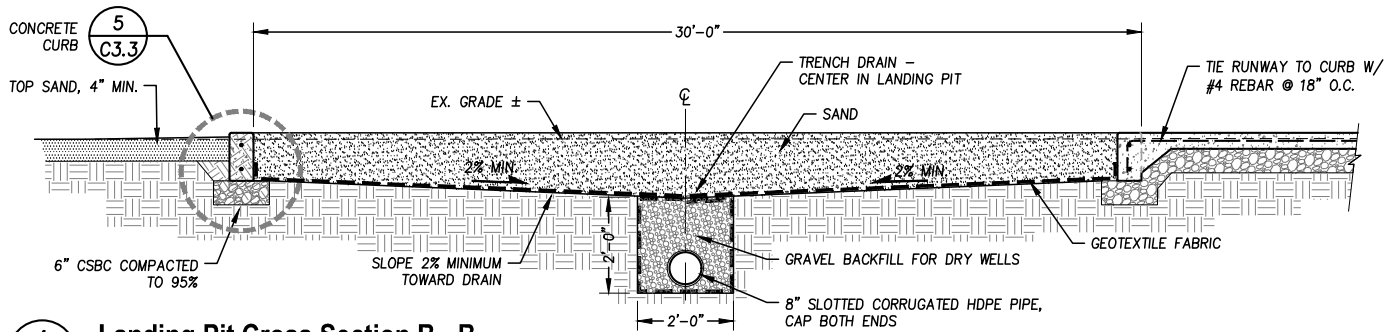
1 Long Jump - Triple Jump Plan
SCALE: 1/8"=1'-0"



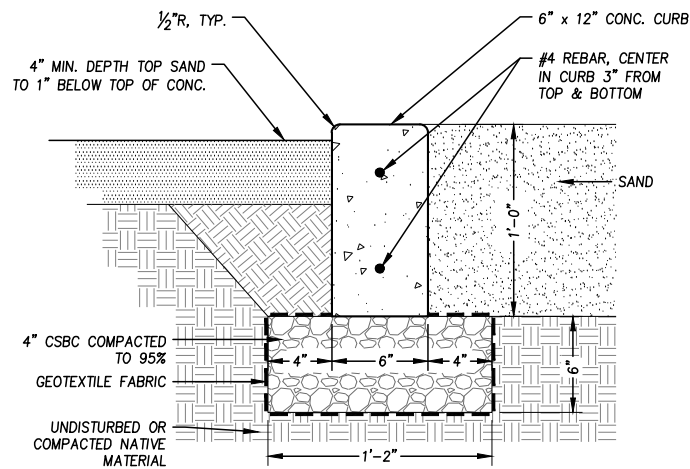
2 Runway Striping
SCALE: 1/4"=1'-0"



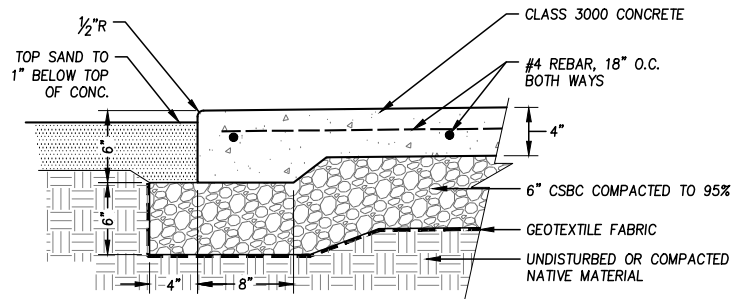
3 Runway Cross Section A - A
SCALE: 1/2"=1'-0"



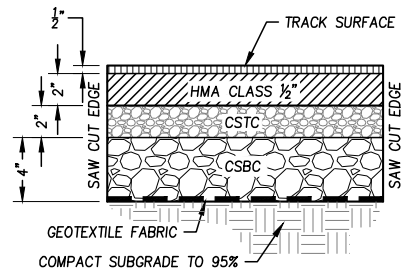
4 Landing Pit Cross Section B - B
NOT TO SCALE



5 Concrete Curb Section
SCALE: 2"=1'-0"



6 Thickened Edge Section
SCALE: 1 1/2"=1'-0"



7 HMA Track Surfacing Patch
SCALE: 2"=1'-0"

Yelm High School Stadium Field Conversion

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DATE: JANUARY 7, 2019

Site Details

C3.3

Sheet - of -

Technical Memorandum

TO: Bob Droll, President
FROM: Lance Levine, PE, and Calvin McCaughan, PE
DATE: November 28, 2018
RE: **Summary of Geotechnical Engineering Services**
Yelm High School Field Conversion
Yelm, Washington
Project No. 1444008.010.011

Introduction

This technical memorandum summarizes the results of geotechnical engineering services provided by Landau Associates, Inc. (LAI) in support of the Yelm High School football field conversion project, located at 1315 West Yelm Avenue in Yelm, Washington (site; Figure 1). This memorandum has been prepared with information provided by representatives of Robert W. Droll, Landscape Architect, PS (landscape architect) and Yelm Community Schools (owner); data collected during our field exploration and laboratory testing programs; our familiarity with the project area; and our experience with similar projects.

The general project location is shown on Figure 1. Figure 2 shows pertinent site features and the approximate locations of the explorations completed for this study. Figure 3 presents the classification system used to describe the soil types observed in our explorations. Figures 4 through 6 present summary logs of the subsurface conditions observed at the site, and Figures 7 and 8 present the results of grain size distribution analyses performed on select samples obtained from the explorations.

Project Understanding

Yelm Community Schools proposes to update the Yelm High School football field by replacing existing grass surfacing with synthetic turf. Final site grades will approximate existing grades.

Scope of Services

Geotechnical services were provided in accordance with the scope outlined in our July 31, 2018 proposal, authorized on October 9, 2018. To support project design, we completed the following tasks:

- Reviewed available published geologic maps and geotechnical reports for the project area.
- Coordinated public utility locates.
- Excavated six test pits (TP-1 through TP-6) to a maximum depth of 8.0 feet (ft) below ground surface (bgs).

- Collected representative soil samples and completed laboratory testing to facilitate classification and estimation of engineering soil properties.
- Prepared and submitted this memorandum, summarizing the results of our field investigation and providing geotechnical conclusions and recommendations for the proposed field conversion.

Site Conditions

The 36.6-acre site is currently developed with school buildings, portable classrooms, ball fields, tennis courts, asphalt-surfaced parking and drive lanes, and landscaped areas. The site is bordered by West Yelm Avenue to the east, commercial properties and 93rd Avenue South to the north, undeveloped property to the west, and residential and undeveloped properties to the south. The high school football field is surfaced with grass and ringed by a synthetic running track. Site topography is generally level, and slopes gently to the southwest.

Geologic Review

Geologic information for the project area was obtained from the *Geologic Map of the Centralia Quadrangle, Washington* (Schasse 1987). The map classifies near-surface deposits at the site as Outwash Gravel (Qgog). In the project area, this unit generally consists of well-draining, medium dense to dense sand and gravel with cobbles.

Subsurface Explorations

Subsurface soil and groundwater conditions were explored on November 8, 2018 by excavating six test pits (TP-1 through TP-6) 7.5 to 8.0 ft bgs. The approximate locations of the explorations are shown on Figure 2. Figure 3 presents the classification system used to describe the soil types observed in the explorations, and Figures 4 through 6 present summary logs of subsurface conditions observed at the site.

Soil Conditions

The soils observed in our explorations can be categorized into two general units:

- **Topsoil:** Topsoil was observed to approximately 8 inches in all test pits. This unit typically consists of 2 inches of sod over 6 inches of loose, fine to coarse sand.
- **Recessional Glacial Outwash:** Recessional glacial outwash was observed in all test pits from approximately 8 inches bgs to the maximum depth explored. This unit typically consists of dark brown sand and gravel with variable silt content over a brown, sandy gravel with variable cobble and boulder content.

Groundwater Conditions

During our November 8, 2018 field explorations, groundwater was not observed to 8.0 ft bgs. However, data obtained from nearby monitoring wells indicate groundwater levels may be as shallow as 15 ft bgs.

Groundwater conditions are for the specific date and locations indicated, and may not be indicative of other locations and/or times. Furthermore, groundwater conditions will vary depending on local subsurface conditions, the weather, and other factors. Groundwater levels in the project area are expected to fluctuate seasonally, with maximum groundwater levels occurring during late winter and early spring.

Conclusions and Recommendations

In our opinion, site soils are well draining. Deeper soils will provide higher infiltration rates, if needed.

Infiltration Rate Assessment

Infiltration rates were determined using the soil grain size analysis method in the Washington State Department of Ecology's (Ecology) *2012 Stormwater Management Manual for Western Washington, as Amended in December 2014* (2014 SWMMWW). The site is underlain by recessional glacial outwash, a unit typically well suited for infiltration, provided there is adequate separation between the bottom of the stormwater facilities and the groundwater table. We understand an underdrain system will be required for poorly draining soils.

Groundwater was not observed to 8.0 ft bgs during our November 2018 explorations, but could be present at shallower depths during the wet season (typically late October through June). Based on our review of Ecology's well reports (accessed November 20, 2018), we used a seasonal high groundwater level of approximately 15 ft bgs to estimate preliminary infiltration rates.

The infiltration rates of onsite soils were estimated using the soil grain size analysis method in the 2014 SWMMWW and the results of our laboratory tests (Figures 7 and 8). Volume III, Section 3.3.6 of the 2014 SWMMWW provides the method and recommended correction factors used to determine the infiltration rates. Correction factors to account for site variability and the number of locations tested ($CF_v = 0.8$), test method ($CF_t = 0.4$), and biofouling and siltation effects ($CF_m = 0.9$) were applied to the initial infiltration rates. We assumed a separation of at least 11 ft between the base of the facility and seasonal high groundwater (D_{wt}). We also assumed a ponded water depth (D_{pond}) of 1 ft. These assumptions should be verified or corrected during final design. Preliminary infiltration rates for the specific locations and depths indicated are provided in Table 1.

Table 1. Preliminary Factored Infiltration Rates

Exploration and Sample Depth (ft bgs)	Depth Range (ft bgs)	Preliminary (factored) Infiltration Rate (inches/hour)
TP-1 at 1.5	0.5–2.5	0.58
TP-2 at 1.5	0.5–2.5	0.27
TP-2 at 3.5	2.5–8	1.35
TP-3 at 3.0	2–7.5	0.79
TP-4 at 3.0	2–8	1.62
TP-5 at 1.0	0.5–1.75	0.26
TP-6 at 2.0	0.5–4	0.32
TP-6 at 5.0	4–8	3.35

Note: Seasonal high groundwater is assumed to be at or near 15 ft bgs.

bgs = below ground surface

ft = feet

In general, the infiltration rates increase with depth, and deeper soils are typically cleaner with a lower fines content (i.e., silt and clay). The fines content may not be consistent between explorations, and infiltration rates may vary with depth and location.

Use of This Technical Memorandum

LAI prepared this technical memorandum for the exclusive use of Robert W. Droll, Landscape Architect, PS and Yelm Community Schools. Use of this memorandum by others, or for purposes other than intended, is at the user's sole risk. Within the limitations of scope, schedule, and budget, our services have been conducted in accordance with generally accepted practices of the geotechnical engineering profession; no other warranty, express or implied, is made as to the professional advice included in this memorandum.

The findings, conclusions, and recommendations presented herein are based on our understanding of the project, our review of available geotechnical and geologic information for the project area, and the results of our field explorations. Variations in subsurface soil and groundwater conditions may not become evident until construction. A contingency for unanticipated conditions should be included in the construction budget and schedule.

Closing

We appreciate the opportunity to provide geotechnical services for this project. If you have questions or comments, or if we may be of further service, please call the undersigned at (360) 791-3178.

LANDAU ASSOCIATES, INC.



Lance Levine, PE
Senior Project Engineer



Calvin McCaughan, PE
Principal



LGL/CAM/mcs

[\\OLYMPIA1\PROJECTS\1444\008.010\R\VELM HIGH SCHOOL FIELD CONVERSION TECHNICAL MEMORANDUM.DOCX]

References

- ASTM. 2017. D4288-17. Standard Practice for Description and Identification of Soils (Visual-Manual Procedures). West Conshohocken, PA: ASTM International.
- Ecology. 2014. *2012 Stormwater Management Manual for Western Washington, as Amended in December 2014*. Washington State Department of Ecology. December.
- Ecology. Well Reports. Washington State Department of Ecology. Accessed November 20, 2018. Available at:
<https://fortress.wa.gov/ecy/waterresources/map/WCLWebMap/WellConstructionMapSearch.aspx>.
- Schasse, H.W. 1987. *Geologic Map of the Centralia Quadrangle, Thurston County, Washington*. Washington State Department of Natural Resources.

Attachments: Figure 1. Vicinity Map
Figure 2. Site and Exploration Plan
Figure 3. Soil Classification System and Key
Figures 4–6. Logs of Test Pits
Figures 7–8. Grain Size Distribution

G:\Projects\1444\008\010\011\F01VicMap.mxd 11/13/2018



Data Source: Esri 2012

Yelm High School
Field Conversion
Yelm, Washington

Vicinity Map

Figure

1



LANDAU
ASSOCIATES



Legend

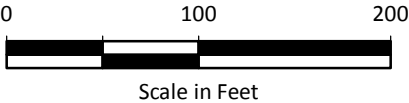
TP-1 ■ Test Pit Location and Designation

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Esri World Imagery.

Yelm High School Field Conversion Yelm, Washington	Site and Exploration Plan	Figure 2
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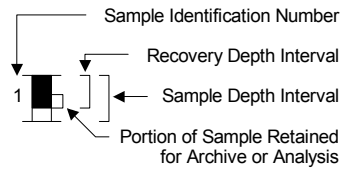
Soil Classification System

	MAJOR DIVISIONS		USCS GRAPHIC SYMBOL	LETTER SYMBOL ⁽¹⁾	TYPICAL DESCRIPTIONS ⁽²⁾⁽³⁾
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
				GM	Silty gravel; gravel/sand/silt mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SP	Poorly graded sand; gravelly sand; little or no fines
				SM	Silty sand; sand/silt mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

- Notes:
- USCS letter symbols correspond to symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM for sand or gravel) indicate soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
 - Soil descriptions are based on the general approach presented in the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the Standard Test Method for Classification of Soils for Engineering Purposes, as outlined in ASTM D 2487.
 - Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:
 - Primary Constituent: > 50% - "GRAVEL," "SAND," "SILT," "CLAY," etc.
 - Secondary Constituents: > 30% and ≤ 50% - "very gravelly," "very sandy," "very silty," etc.
> 15% and ≤ 30% - "gravelly," "sandy," "silty," etc.
 - Additional Constituents: > 5% and ≤ 15% - "with gravel," "with sand," "with silt," etc.
≤ 5% - "with trace gravel," "with trace sand," "with trace silt," etc., or not noted.
 - Soil density or consistency descriptions are based on judgement using a combination of sampler penetration blow counts, drilling or excavating conditions, field tests, and laboratory tests, as appropriate.

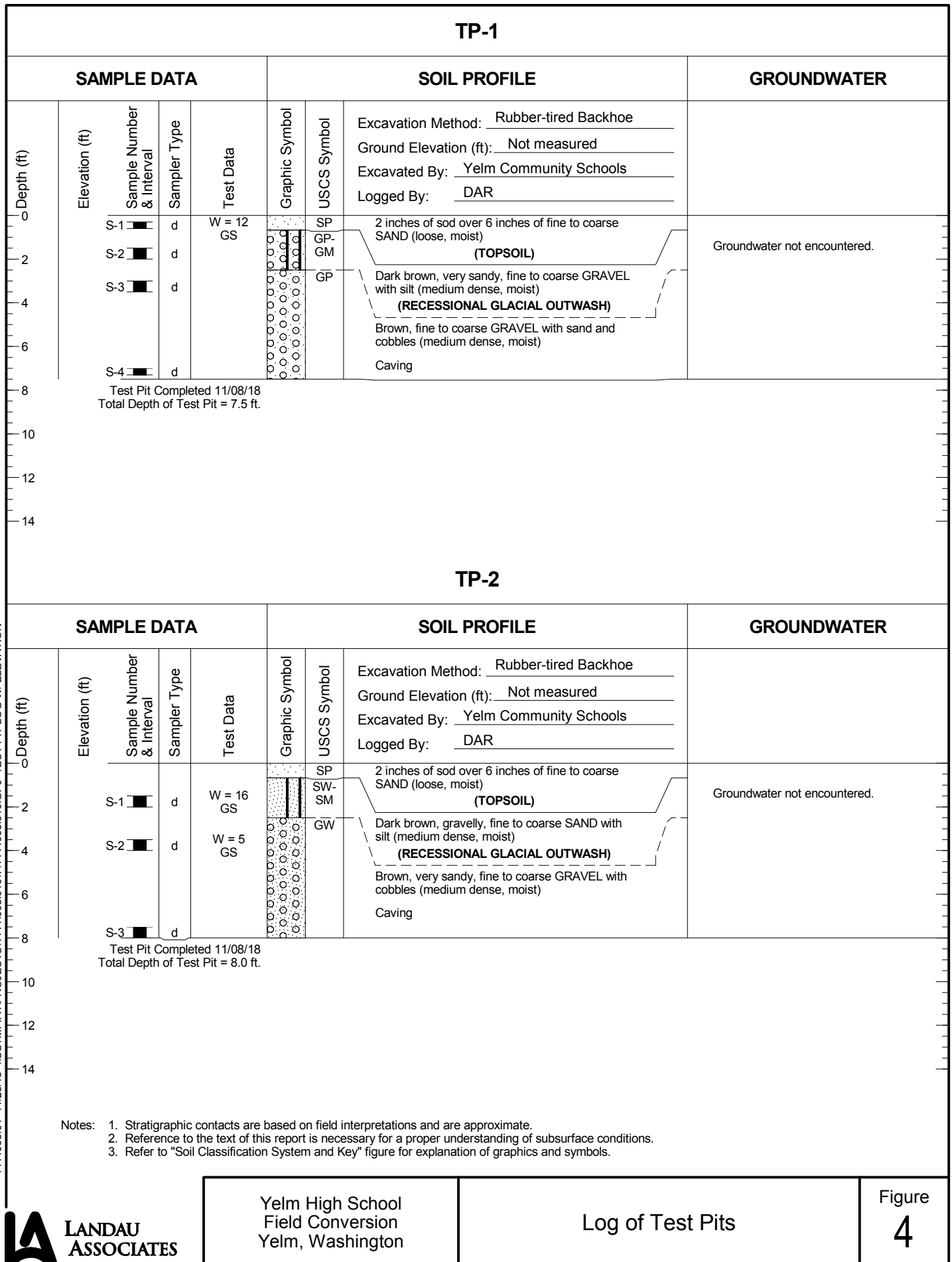
Drilling and Sampling Key			Field and Lab Test Data	
SAMPLER TYPE	SAMPLE NUMBER & INTERVAL		Code	Description
Code	Description			
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon		PP = 1.0	Pocket Penetrometer, tsf
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon		TV = 0.5	Torvane, tsf
c	Shelby Tube		PID = 100	Photoionization Detector VOC screening, ppm
d	Grab Sample		W = 10	Moisture Content, %
e	Single-Tube Core Barrel		D = 120	Dry Density, pcf
f	Double-Tube Core Barrel		-200 = 60	Material smaller than No. 200 sieve, %
g	2.50-inch O.D., 2.00-inch I.D. WSDOT		GS	Grain Size - See separate figure for data
h	3.00-inch O.D., 2.375-inch I.D. Mod. California		AL	Atterberg Limits - See separate figure for data
i	Other - See text if applicable		GT	Other Geotechnical Testing
1	300-lb Hammer, 30-inch Drop		CA	Chemical Analysis
2	140-lb Hammer, 30-inch Drop			
3	Pushed			
4	Vibrocore (Rotasonic/Geoprobe)			
5	Other - See text if applicable			

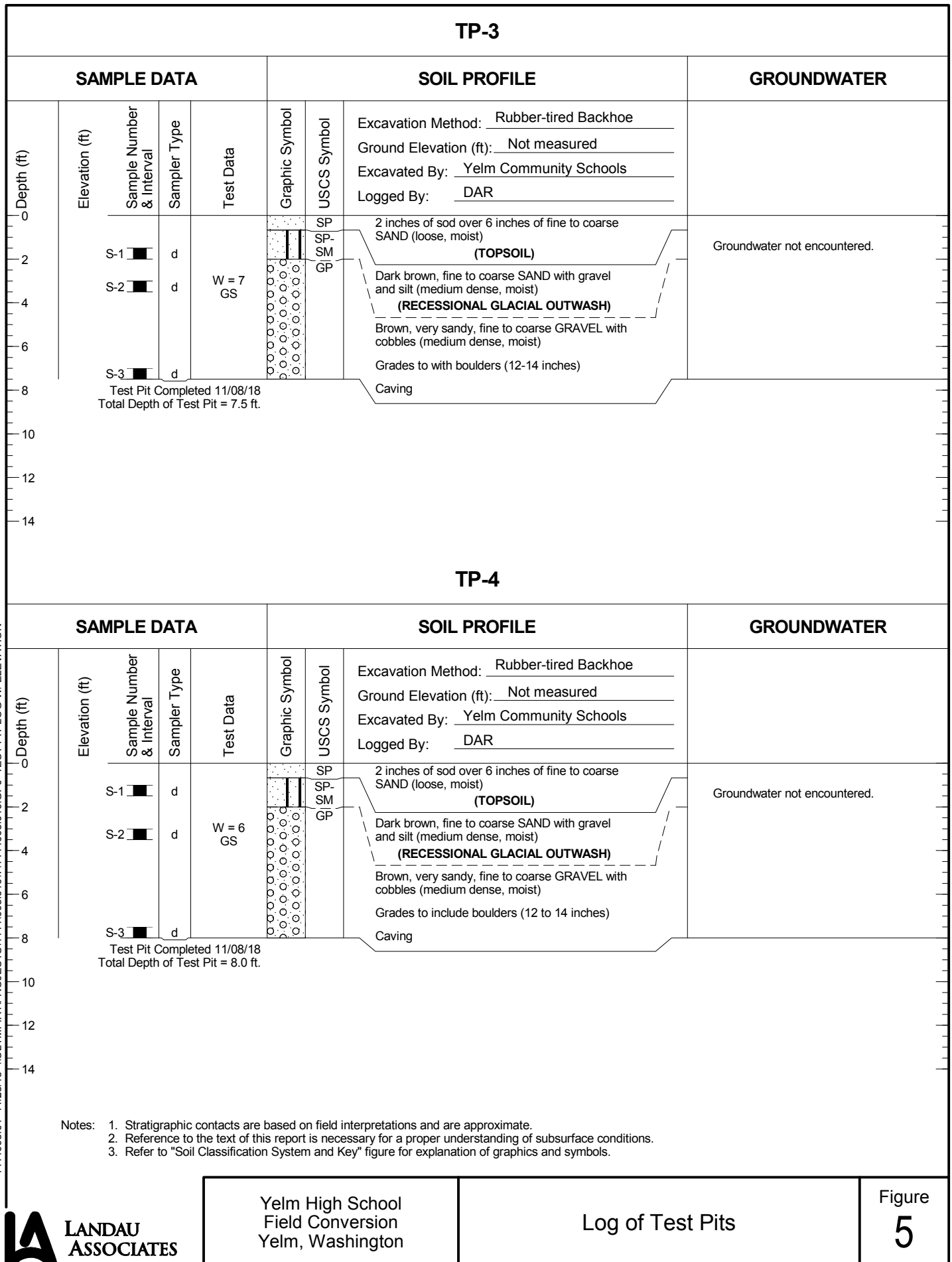


Groundwater

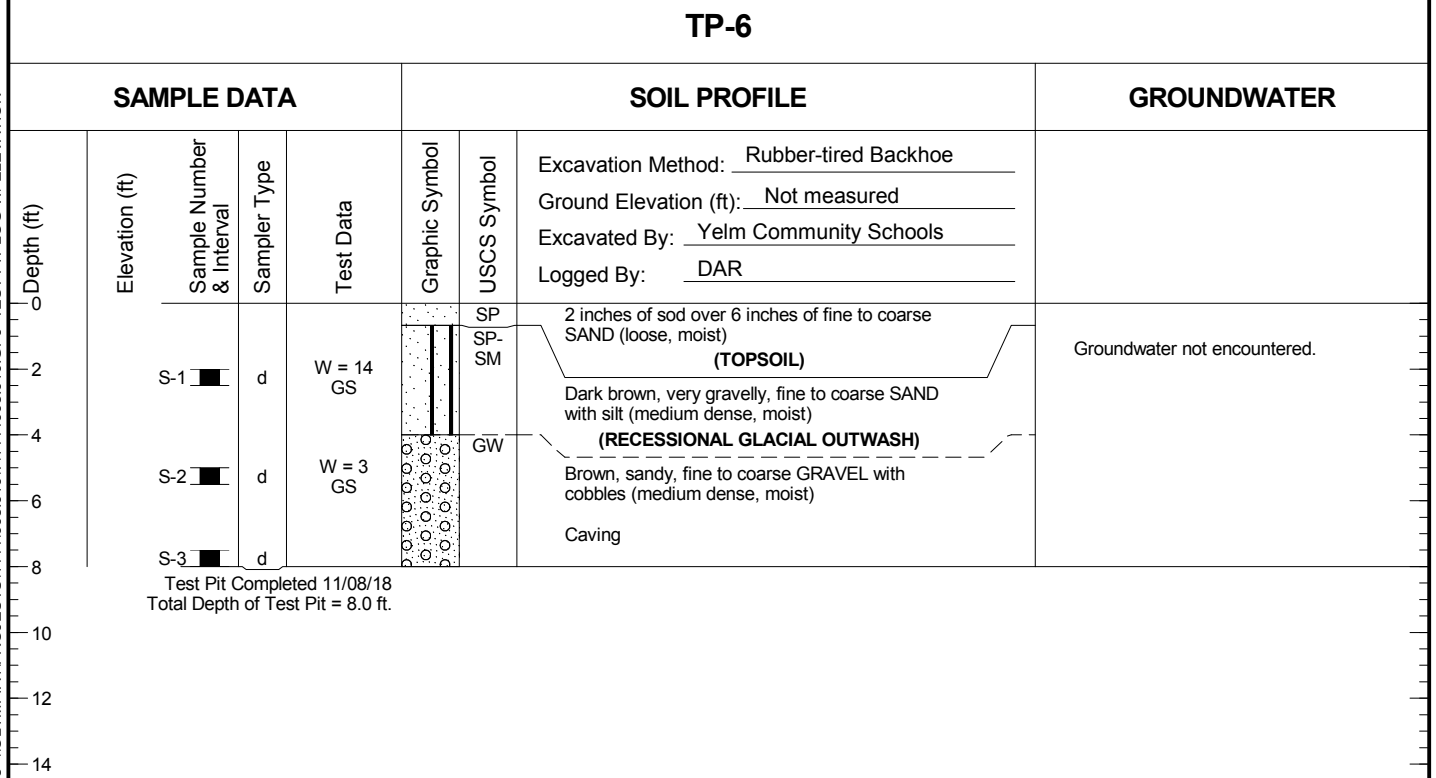
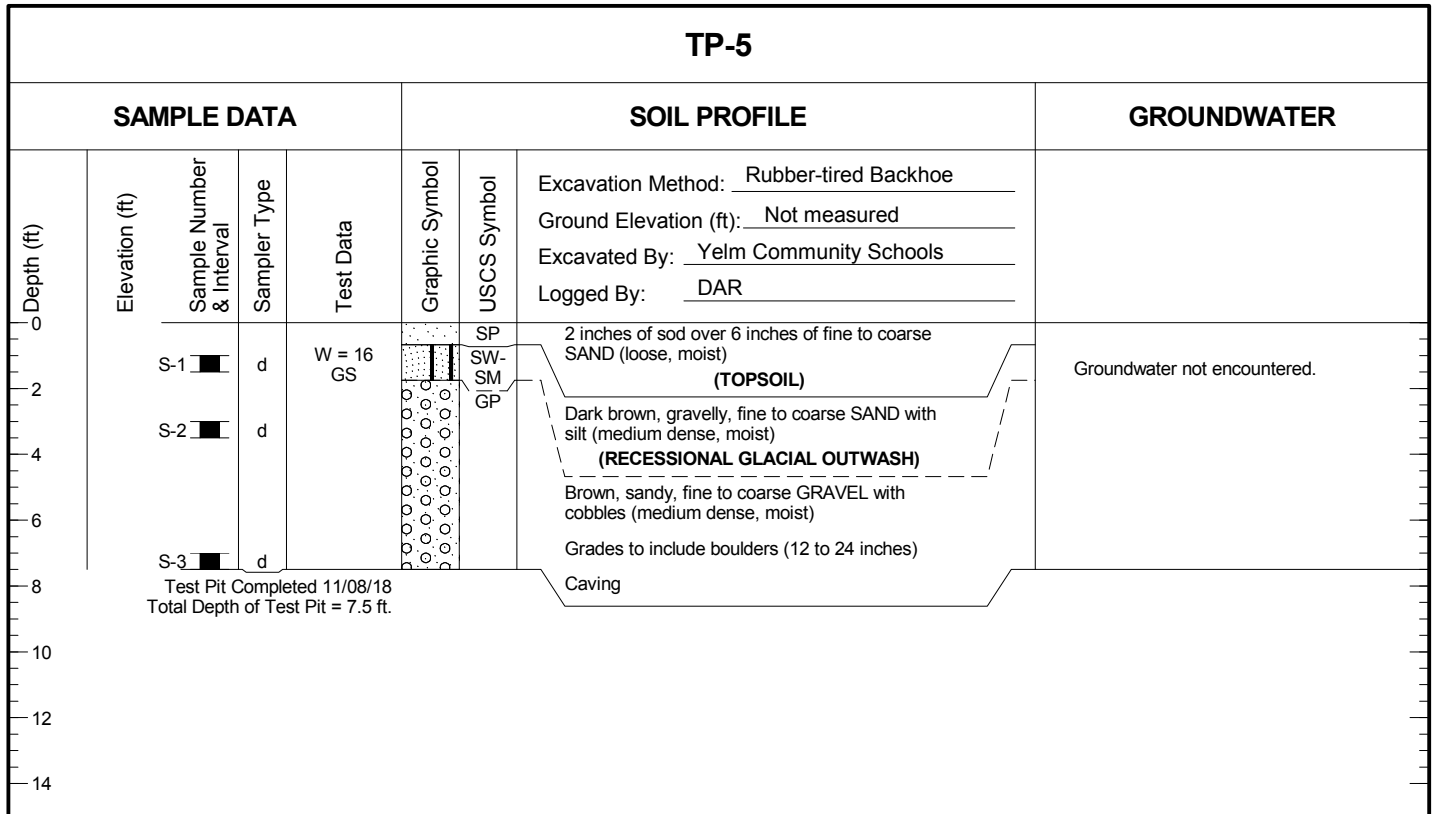
Approximate water level at time of drilling (ATD)

Approximate water level at time after drilling/excavation/well

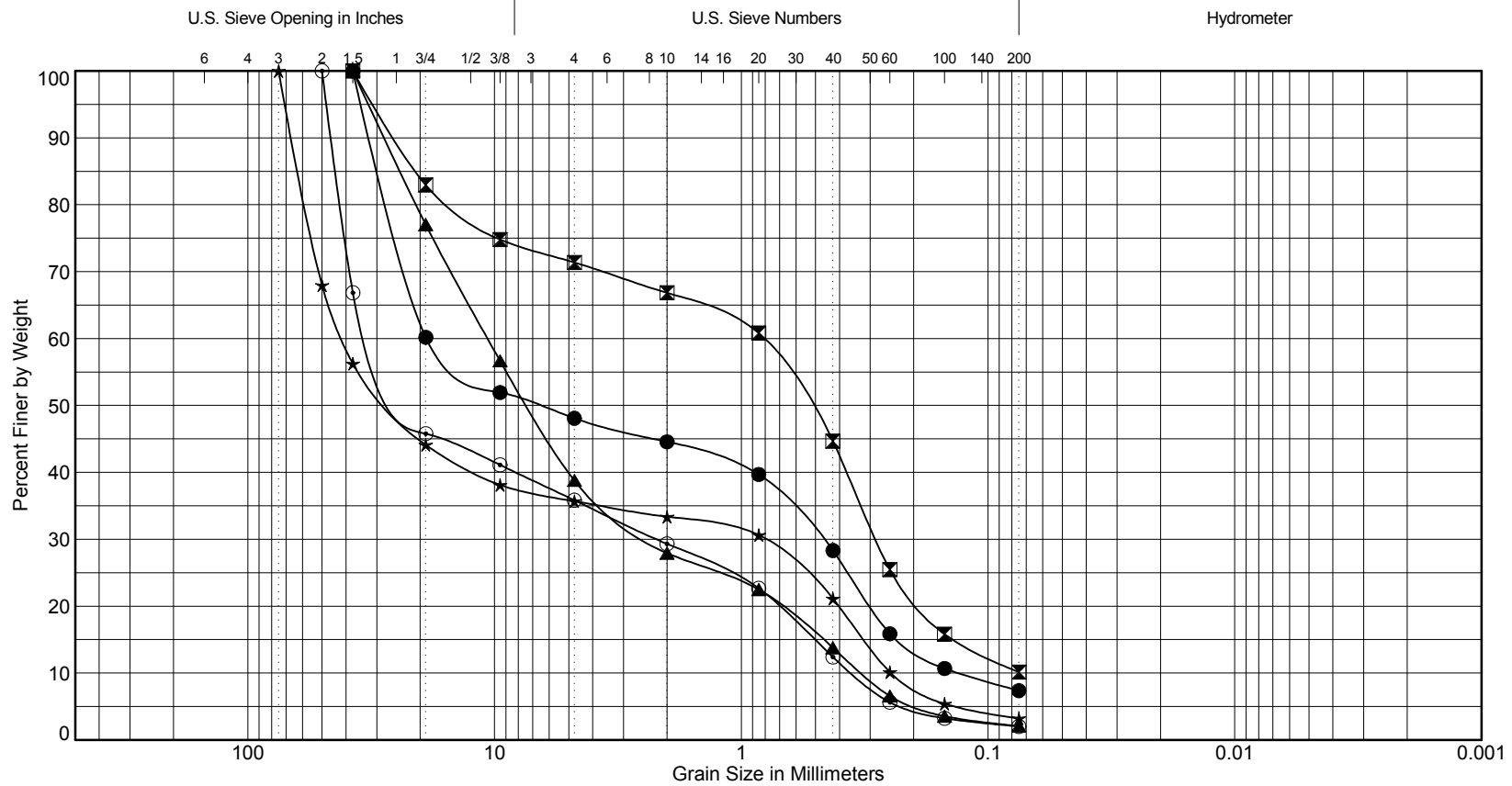




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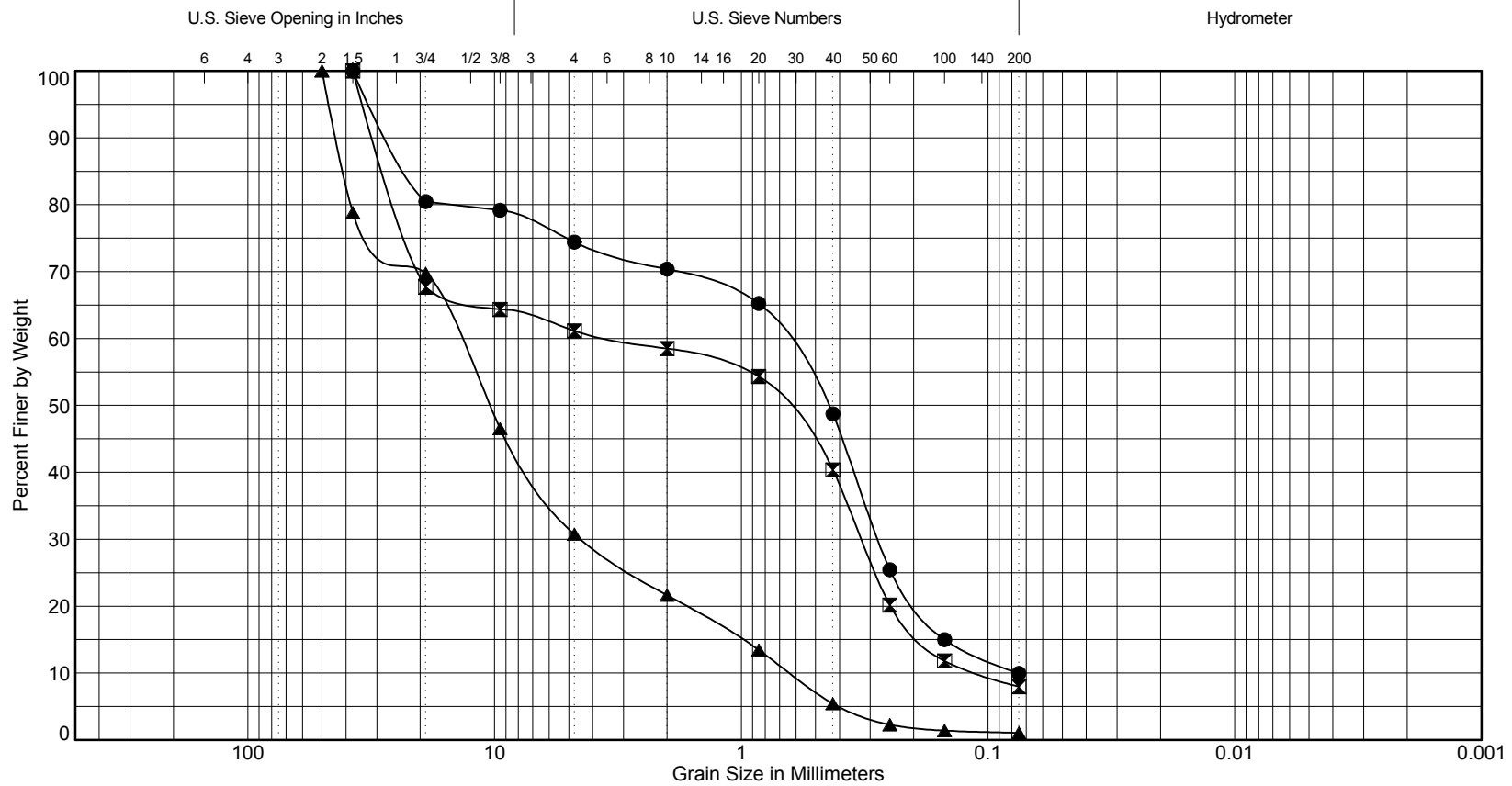


- Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
 2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
 3. Refer to "Soil Classification System and Key" figure for explanation of graphics and symbols.



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	TP-1	S-1	1.5	12	Very sandy, fine to coarse GRAVEL with silt	GP-GM
⊠	TP-2	S-1	1.5	16	Gravelly, fine to coarse SAND with silt	SW-SM
▲	TP-2	S-2	3.5	5	Very sandy, fine to coarse GRAVEL	GW
★	TP-3	S-2	3.0	7	Very sandy, fine to coarse GRAVEL	GP
⊙	TP-4	S-2	3.0	6	Very sandy, fine to coarse GRAVEL	GP



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Exploration Number	Sample Number	Depth (ft)	Natural Moisture (%)	Soil Description	Unified Soil Classification
●	TP-5	S-1	1.0	16	Gravelly, fine to coarse SAND with silt	SW-SM
⊠	TP-6	S-1	2.0	14	Very gravelly, fine to coarse SAND with silt	SP-SM
▲	TP-6	S-2	5.0	3	Sandy, fine to coarse GRAVEL	GW